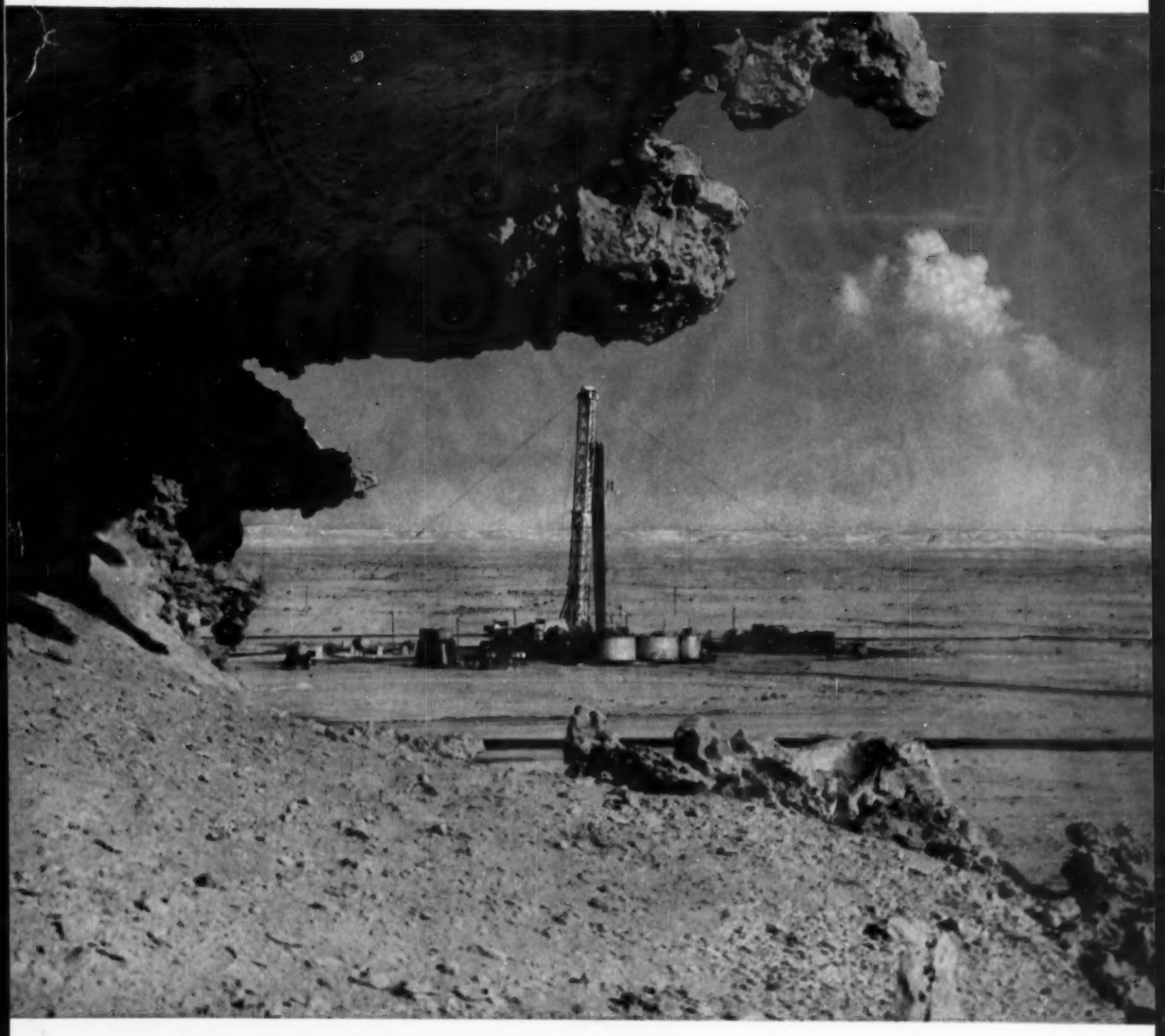
INTERNATIONAL REVIEW ISSUE



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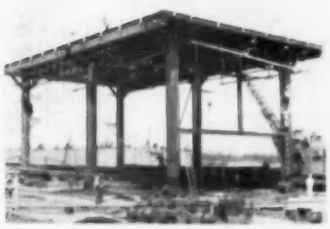

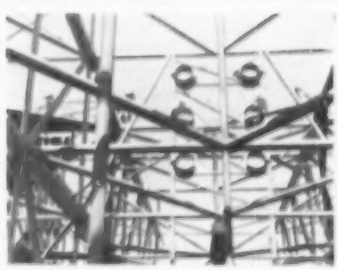

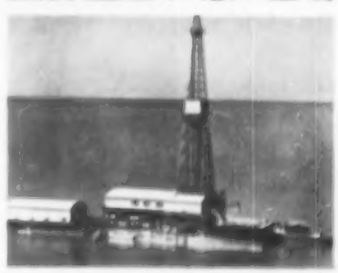

Avondale's name became famous throughout the nation and the world primarily through marine construction and repair. And that same fame, through the satisfaction of our many customers—brought diversification in other specialized fields! Today Avondale specialties, as pictured on this page, have made Avondale's name famous the world over . . . .

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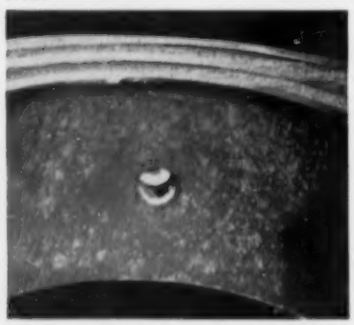
New Burrless Cap for Ogival Bullet Provides Burr-Free Penetration

The new Burrless Bullet Cap is an exclusive McCullough feature. Inserted over the point of the improved ogival bullet at the time the perforator is loaded, it provides a completely burr-free hole on the inside surface of the perforated casing. Depth of penetration is not affected. Burr-free holes reduce the need for subsequent scraping and insure free passage of swabs, packers or other close fitting tools.



Unretouched photo above shows three string penetration by ½" Ogival Bullet with exclusive McCullough Burrless Bullet Cap. Note smooth, burr-free inner surface of pipe.

New Bulletin Available on M-3 Guns

This four-page, illustrated bulletin, No. 203, describes recent improvements in M-3 Bullet Perforator design and introduces the new, deeper penetrating Ogival Bullets. It gives specific examples of increased firing power and deeper penetration as experienced in competitive tests. Advantages, general characteristics, sizes, etc. are also given.

Request Bulletin No. 203 from McCullough Tool Company, 5820 South Alameda Street, Los Angeles 58, California.

Deeper Penetration Increases Production 2700 B/D

McCullough M-3 Bullet Guns Perforate 411 Feet of Pay Zone to Increase Production 245%

Excellent results obtained by the improved M-3 Bullet Perforator were dramatically illustrated by a recent field report from McCullough's Bakersfield Branch area.

M-3 Guns firing improved Ogival Bullets perforated 411 feet of oil zone for a 2700 B/D increase in production.

This well had previously been perforated by another service company for 1100 barrels per day. However, the operator believed better production was possible and called McCullough to re-perforate.

McCullough Service Crew made 17 runs with 3⅜" O.D. double 20-shot M-3 Guns, 14 runs with 3⅛" O.D. double 10-shot M-3 Guns and 8 runs with 3⅛" O.D. M-3 Guns one shot every two feet—a total of 39 runs in 39½ hours rig time.

A total of 1,000 improved ½" Ogival Bullets were shot in 5" O.D. 15 lb. cemented casing between 10,565' and 10,976'. Production increased from 1100 to 3800 barrels per day—a 245% gain.

Results like this can only be obtained by deepest penetration—penetration that reaches far out into the pay zone; exposes more productive formation; gets more oil—the kind of penetration you get only from McCullough M-3 Bullet Perforators.

McCullough Opens Two New Branches In Mountain Area

McCullough Tool Company has just opened new service branches at Westhope, North Dakota and Grand Junction, Colorado.

Both branches are fully equipped to render all McCullough wire line and fishing tool services to the rapidly expanding oil industry of the Rocky Mountain area.

Experienced crews, dependable equipment and skilled service are available on a twenty four hour basis.

McCullough M-3 Outshoots Premium Bullet Guns

In a very recent series of competitive tests, set up and supervised by a major oil company, regular improved McCullough M-3 Bullet Perforators outshot the premium priced guns of two other service companies. Here are the results:

	Average Penetration into Special Targets
McCullough	5¼"
Company A	4⅜"
Company B	4⅛"

McCullough TOOL COMPANY

LOS ANGELES
HOUSTON
EDMONTON

WORLD PETROLEUM for September, 1955. Vol. 26, No. 10, September, 1955. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Accepted under Section 34.64 P.L.&R. at Bristol, Conn. Subscription rate: $5.00 per year, single copies $1.00. Copyright 1955, by Mona Palmer, Trustee.

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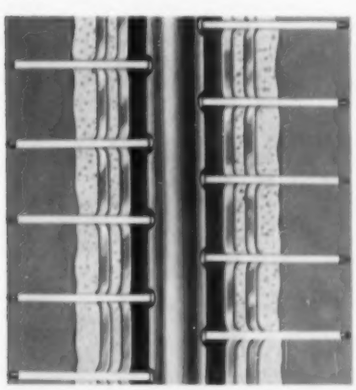
Uniform Hole Pattern in Casing Plus Deep Penetration Means More Barrels of Oil

Among the many benefits of M-3 Bullet Perforating is the uniformity of hole pattern in the casing. This perforating pattern is the same as the chambers in the gun itself. Shots are placed in patterns of staggered rows. This permits the safe use of more holes per foot in the casing, assures complete, uniform coverage of the productive zone, provides maximum drainage area from the formation and eliminates the possibility of bunching all shots in one area in the casing.

A fine example of effective perforating by M-3 Guns was recently reported from Wyoming.

Five inch O.D. 18 lb. liner had been set through the pay at 4300' and was perforated by another service company for 60 barrels of oil per day.

McCullough reperforated with 204 new ½" Burrless Ogival Bullets in three hours rig time. Well was put on the pump for 260 barrels per day—over a 300% increase in production—and has maintained this production after being on the pump for some time.



Improved McCullough M-3 Bullet Perforators fire one to six shots per foot, one to ninety at a time and are placed exactly where they are wanted. Uniform hole pattern plus deepest penetration assures more effective drainage of pay zone—More Oil!

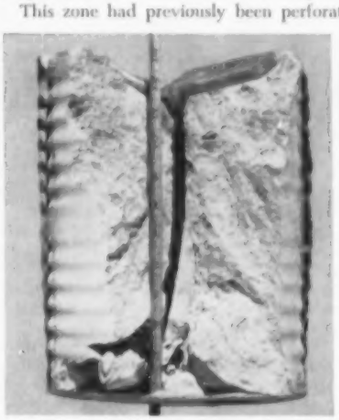
M-3 Bullet Guns Increase Production From 13,000 CF/D to 8 Million CF/D

Deep Penetration Through Thick Cement Sheath Increases Gas Production to 615 Times Previous Rate

The outstanding penetrating ability of improved McCullough M-3 Bullet Perforators was responsible for a startling increase in gas production from a Colorado well, according to a recent job report from the area.

Gas zone was located between 5349' and 5395'. Open hole, in the pay interval, was calipered at 13". 7" O.D. 23 lb. casing was set and cemented through the zone.

This zone had previously been perforated by another service company using the permanent type well completion method, and the well made 13,000 cu. ft. of gas per day.



7" O.D. 26 lb. N-80 casing set in cement and perforated by 4¼" O.D. McCullough M-3 Bullet Perforator. Test sample was standing on a steel plate and ½" Burrless Bullet penetrated entire depth of target and ⅜" into steel plate.

McCullough was called to re-shoot the same zone. Made five runs with improved McCullough 4¼" 20-shot M-3 Guns and fired 184 ½" Burrless Bullets in the 46' gas zone. A considerable increase in gas pressure was recorded after each run. After perforating was completed, the well tested at 8 million cu. ft. of gas per day and has continued to be a good producer.

Penetration like this is not out of the ordinary. M-3 Guns firing the new ogival bullets are capable of penetrating as many as three strings of cemented casing and deep into the productive formation. They give you premium penetration at no extra cost—they get the kind of results you want—greater production with maximum economy.

M-3 GUN PENETRATES CEMENT LEFT BY FIVE SQUEEZE JOBS

Five and one-half inch 17 lb. casing had been set through pay at approximately 6386'. Well had been squeezed five times to obtain W.S.O., leaving a great deal of cement to be penetrated.

Two different makes of jet perforators were fired at the desired depth without results. An improved 4¼" O.D. McCullough M-3 Bullet Gun fired four shots in the same interval and made a well of 125 barrels per day. Time on job: One hour.

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LOS ANGELES
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Washington PIPE LINE

By Joseph B. Huttlinger

Heavy Agenda for October Meeting of National Petroleum Council

A broad range of subjects is expected to come in for attention when the National Petroleum Council holds its final meeting of the year on October 20.

The subjects will cover crude oil pipe lines, voluntary agreements, dollar a year men, oil imports, proration and income tax incentives for oil and gas expansion.

The council, which is composed of about 100 industry leaders in all phases of the petroleum and natural gas industry, advises Secretary of the Interior Douglas McKay about oil and gas matters. The council was started in 1946 under Secretary of the Interior J. A. Krug.

Walter S. Hallanan, a Republican leader, and head of Plymouth Oil Co., Pittsburgh, Pa., has been chairman since the council started.

The council, itself, may be the first order of business, although unofficially. Stanley N. Barnes, head of the antitrust division of the Department of Justice, has called the operations of the council somewhat "unsatisfactory." He thinks the council should conform to rules for all industry advisory committees, which call for a government man to serve as chairman.

The government's aim of more crude oil capacity by pipe line to the East Coast may come in for attention after years of planning and study by the Department of Interior and Defense and the Office of Defense Mobilization. One plan has been to stockpile line pipe for speedy laying in the event of war. Another has been to build a products pipe line from Texas to the East Coast, for conversion to crude in event of war. At present, a crude oil line to the East Coast is not economic.

A step in the right direction, as government sees it, is the plan of Texas Eastern Transmission Corp., Shreveport, La., to convert part of the wartime "little inch" pipe line from natural gas to oil products. Another plan is that of the American Pipe Line Corp., which wants government financial help on a 1,600-mile oil products line from Beaumont, Texas to Newark, N. J.

The Foreign Petroleum Supply Committee of the industry, which gathers facts on worldwide supply and demand for government use, may be at a crossroads, with industry asking this question: Shall the committee continue or go out of business?

A number of Congressmen have made attacks on voluntary industry agreements of this kind, and the Department of Justice has completed a study of the agreement and found it kept within the bounds it set for itself.

Franz Von Schilling, the government man who has the contact with the foreign supply agreement, resigned during the attacks, which spilled over to "without compensation" officials. Von Schilling, a top flight oil executive, has been on leave from the California Texas Oil Co. to work for the government on the agreement question.

Brig. Gen. W. W. White, head of the petroleum logistics office of the Department of Defense, meanwhile has been the subject of attacks in the U. S. Congress. He testified that he left as vice president of Esso Export Corp. to join the Department of Defense for two years, and plans to return to his company in February 1956.

With the Department of Defense, he received the regular pay for his rank, he testified, and Esso makes up the difference between this and what he had received with Esso. This was called "scandalous" by Senator Matthew Neely, D., W. Va., who wants to keep out foreign oil to protect American coal producers, but "proper and regular" by Representative Edward Hebert, D., La., chairman of a House Armed Services Subcommittee who heard White explain his set up.

The Department of Defense, meanwhile, issued a statement in defense of the White arrangement, saying it is common practice when industry men come back to service for a time as reserve officers. President Eisenhower told a press conference he knows nothing wrong in the arrangement.

Hugh A. Stewart, director of the office of oil and gas of the Department of the Interior, formerly the oil and gas division, also felt the barb of Congressional criticism. He testified that he received a pension after a lifelong career with the Texas Co. This, too, drew some criticism from Congressional leaders in the midst of a political war between the administration under the Republicans and the Congress under the Democrats.

The level of imports of crude petroleum and products is sure to come up for attention, as the Office of Defense Mobilization is making studies to see if they are so high as to hurt the national security. The study is under legislation of the U.S. Congress. If oil imports "exceed significantly" their ratio to domestic production of 1954, they may be too high under the law.

The crude oil proration system, guided by the Interstate Oil Compact Commission, was given the green light by the U. S. Congress, but with one change. This is that the Justice Department shall make annual reports upon the operation of the compact and, specifically, state whether the compact goes in for any price fixing in crude oil. This is not a matter for the council to consider directly, but it may come up for some attention.

A go slow policy on giving income tax incentives for expansion in petroleum and other fields has set in, under the urging of Secretary of the Treasury George Humphrey and others. This, probably, will also come up for attention.

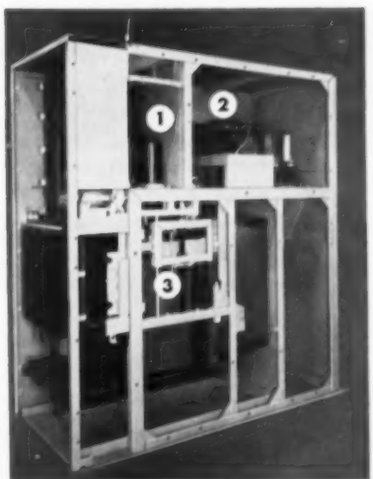
During the past five years, the major expansion in oil and natural gas has been done under certificates of necessity, which provide that part of the cost of a new or expanded plant may be written off in five years for income tax purposes. This has been of some benefit, but with the Korean war over and the U. S. petroleum plant at an all-time high, many feel that the emergency need for this aid has ended.

The council's meeting, which is expected to be the last for this year, is expected to receive routine reports on tank truck transportation, manpower and other subjects. Also, the council is expected to be asked to make new studies in certain fields by Hugh A. Stewart, director of the office of oil and gas of the Department of the Interior. He is the contact man between government and the council.

Photo courtesy of Fort Worth Star-Telegram

G-E SWITCHGEAR TRIUMPHS OVER FLOOD

Metal-clad units stayed in operating condition, needed only minor cleaning when water receded



HERE'S WHY

G-E switchgear was virtually undamaged by flood. Bus (1) and current transformers (2) are located at top. Vertical lift design keeps breaker (3) off floor.

Even though several inches of water actually flooded the lower compartments of General Electric metal-clad switchgear at this Fort Worth plant, no vital parts of the units were affected. Although they are not designed for "flood duty," the advanced features which make the G-E metal-clad units best under ordinary conditions also piled up a record of outstanding service during this period of emergency.

The vertical lift feature, for instance, kept the breaker mechanism safely above the floor. This design improvement was introduced originally as a safety-measure so personnel could actually *see* the disconnect. Mechanically operated, it includes shutters which close automatically over the stationary contacts and provide maximum protection.

Away from dangers such as this flood, the bus is housed at the top of the cabinet in a totally-enclosed, Self-X insulated compartment. Structurally stronger, this arrangement also provides greater electrical protection. The current transformers, like the bus, are also enclosed in a separate compartment, well ventilated for greater protection against excessive humidity.

More information on outstanding new developments is available through the G-E representative nearest you. He will be glad to discuss your electrical problems with you. Consult him early in your planning. *International General Electric Co., 570 Lexington Ave., New York 22, N.Y., U.S.A.* 1A-55-6E

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Natural Gas Bill

The natural gas bill, the most important matter before the present Congress as far as oil and gas is concerned, has a fighting chance of being enacted into law when Congress returns to its sessions next year.

The Senate, which has yet to act on the matter, seems favorably disposed on the basis of nose counts, so the major problem will be to get the matter to a vote. This may be harder than it seems, as some Senators appear ready to try to talk the bill to death.

The bill got halfway through the Congress in July, when the U. S. House of Representatives voted for it by 209 to 203. There is a chance, however, that the measure might have to go back to the House for another vote, and there lies a big hurdle.

Assuming the Senate acts favorably, it could add one or two amendments. If so, this would call for a conference with the House, and then action by the House once again. Since the House vote was close, there is reason for sponsors of the measure to be doubtful about going to the House once again.

While the terms of the bill are far less than many natural gas producers sought, the bill does ease up the present federal price and other controls over producers. By and large, thousands of smaller gas producers are freed of controls, and freed of the need to obtain certificates to sell or stop selling gas to pipe lines, or to drill gas wells.

At the same time, long distance pipe line companies must prove that the rate they are paying for gas in the field is the "reasonable market price" in many instances, before they can get Federal Power Commission approval to pay the rates.

The measure is patterned after the views of a cabinet committee named by President Eisenhower, which reported last February 26. Therefore, there is every reason to expect that the President will sign a measure along these lines if it reaches him.

The need for the bill became real in June 1954 when the U. S. Supreme Court decided that the FPC has control over sales of natural gas by independent producers. Until then, the FPC had never exerted such control. During the past year, the FPC has been trying to work out a method of exercising the new control, which is difficult because of the complex nature of the problem. At the same time, some in the commission have felt that the Congress would enact the clarifying legislation, and that it might be wiser for the commission to try to do as little as possible in the way of control, pending the enactment of legislation. Whether the commission can delay for six months more the taking of hard and fact control and setting new and rigorous policies is yet to be seen.

West Texas-California Pipe Line

Congress continues interested in the idea of a crude oil pipe line from West Texas to California, and the current plans are for more hearings on this early next year.

Representative Edward Hebert, D., La., chairman of a House Armed Services Subcommittee, says he expects to hear at that time from Admiral Arthur W. Radford, chairman of the Joint Chiefs of Staff. Admiral Radford is the top military authority in Washington.

Representative Hebert, who has heard from several witnesses, most of them opposed to government financial help for the line, says he wants to hear directly from the joint chiefs before making a report.

The Hebert subcommittee, which opened hearings on the plan this year, heard from Dr. Arthur S. Flemming, director of the Office of Defense Mobilization; Hugh A. Stewart, director of the office of oil and gas of the Interior Department; Brig. Gen. W. W. White of the petroleum logistics division of the Defense Department; and from a number of West Coast oil and gas producers. The gist of their testimony was that the line is not essential and that no government financing should be given for it.

Lowell M. Glasco of Dallas, president of West Coast Pipe Line Co., urged the subcommittee to endorse his proposal even to the extent of seeking government financial help for the line. Mr. Glasco proposes a 1,000-mile line to cost $106 million, of which he says he has $21 million of the cost. To obtain the rest of the financing, he needs commitments to use the line or a government guarantee of some sort.

Extend Authority of Interstate Oil Compact Commission

There's been little said about it publicly, but the American petroleum industry is more than a little disturbed by the action of Congress as it voted to extend authority for the Interstate Oil Compact Commission until September 1959.

The Senate, and then the House, voted in amendments calling for annual reports from the Department of Justice on the operations of the compact. Specifically, the Department of Justice is to report whether the compact steers clear of limiting crude oil production in an effort to hold up the price, as it avows in its charter.

The American petroleum industry, its hands full with matters in Congress covering oil imports, the natural gas bill and the like, made no fight about the compact amendment. At one point, however, William G. Stratton, chairman of the compact, told the commission:

"This amendment, scurrilous in nature, conceived in a desire to ever widen federal bureaucracy and destroy the rights of the sovereign states to regulate their own affairs, and based upon misinformation or lack of knowledge of the true facts, should be deleted from the resolution in question."

The amendment, however, was added, and the Department of Justice currently is making contact with the Texas Railroad Commission to find out how best to get the facts and make a report back to Congress on the compact.

European Oil Equipment Survey

A survey team of European businessmen from eight countries has published a 136-page report entitled "Oil Equipment in Europe." The members of the survey team included businessmen from Austria, Belgium, France, Germany, the Netherlands, Italy, Switzerland and the United Kingdom.

Among its conclusions, the report called for closer cooperation between the various manufacturers in Europe and closer cooperation between manufacturers and oil companies.

The U. S. trade press in the petroleum field was praised for the "large number of valuable articles," which, said the report, "give extremely wide publicity to a mass of important technical information of interest to all manufacturers." This kind of exchange of information is recommended for Europe.

Canadian Gas Imports

The importation of natural gas from Canada for the U. S. Pacific Northwest may take months before being finally worked out. At that, there is no positive assurance a deal will be worked out quickly.

Pacific Gas now says it will accept no gas unless it comes from the San Juan Basin. This drew objections from several parties, including Colorado Interstate Gas Co., which fears new demands there would jack up the price.

The FPC has broken off hearings until September 19. Then, the thing could be worked out quickly, or turn into a long and complicated matter. Ultimately, Canadian gas seems sure to come to the U. S. The question is, how long is ultimately?

Ask Import Restrictions

American coal producers are planning to go to the U. S. Congress next year to ask legislation to limit oil imports to 10 percent of domestic demand. The only thing which will stop them is action by the Eisenhower administration under the new authority in the Reciprocal Trade Agreements Act to limit imports that are so large as to hurt national security. American petroleum producers may join the coal men.

Oil Company Dividends

U. S. oil companies are paying larger dividends this year than last, according to the U. S. Department of Commerce.

In the first six months of this year, the publicly reported dividends of oil refining companies came to $538 million, against $500 million in the first half a year ago.

Iranian Oil Agreement To Get Further Examination

The Iranian Oil Agreement, which has been under study by the House Judiciary Committee, is due for more attention in the coming months. Rep. Emmanuel Celler, D., N. Y., is chairman of the committee. The committee is questioning whether the agreement, letting five American oil companies go into a consortium with British, French and Dutch companies, violates the U. S. antitrust laws.

The committee is asking the full terms of the agreement, and the full terms of Department of Justice clearance of the agreement from the antitrust standpoint. At present, the committee has but part of the information it seeks.

As it stands, the Department of Justice has told the committee it found as of January 21, 1954 that the agreement "would not of itself constitute a violation of the antitrust laws." Attorney General Herbert Brownell, Jr., so said in a letter which he made available to the committee this summer. There were many conditions to this opinion, however. One was that the security interests of the U. S. require American companies to go into Iran; another that each member of the consortium shall be free to sell his products freely as to buyer and price; a third that the U. S. keeps a free hand to prosecute the pending suit against the alleged "oil cartel."

The basic agreement, however, was withheld from Chairman Celler, and he is continuing to ask for this. Secretary of State John Foster Dulles wrote him that others in the consortium, especially the British Petroleum Co., are opposed to making public the full text of the agreement at this time. As for the secretary himself, he did not give his personal opinion on the matter.

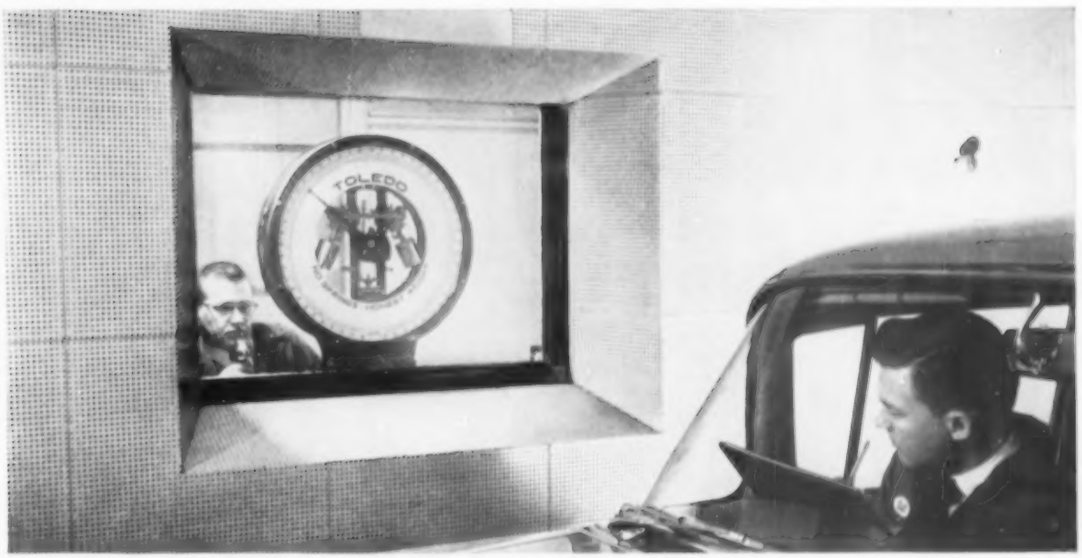
The settlement, it is generally known, came in 1954 after a full series of talks in Washington, Iran, London and elsewhere. A strategy meeting on January 22, 1954 outlined the settlement, Secretary Dulles said. Attending were leaders of both chambers of the U. S. Congress, including Vice President Richard M. Nixon; Senators William Knowland, R., Calif.; Alexander Wiley, R., Wisc.; Leverett Saltonstall, R., Mass.; Walter George, D., Ga.; and Representatives Sam Rayburn, D., Texas; Joseph W. Martin, R. Mass.; Percy Priest, D., Tenn.; Charles Halleck, R., Ind.; and Dewey Short, R., Mo. Also present were Secretary of the Navy Robert Anderson; Admiral Arthur W. Radford, chairman of the Joint Chiefs of Staff; and Under-Secretary of State Herbert Hoover, Jr.

NPC Committee to Study Imports

A committee of 35 members of the National Petroleum Council has been named by Chairman Walter S. Hallanan to make a factual study of oil imports. The committee includes representatives of companies importing petroleum to the United States, of domestic producers, independent refiners and marketers of petroleum and its products.

Jake L. Hamon of Dallas is chairman of the committee. Hines H. Baker, president of Humble Oil and Refining Co., Houston, is vice chairman.

Assistant Secretary of the Interior Felix E. Wormser asked appointment of the committee at the January meeting of the NPC and proposed that it make recommendations, but the agenda committee of NPC barred that "in view of the competitive aspects of the problem" and directed the committee to make only a "factual" report. To expedite the preparation of the requested report, Chairman Hamon has appointed the following technical sub-committee: Richard J. Gonzales (chairman), Humble Oil & Refining Co.; Kenneth E. Beall, Phillips Petroleum Co.; James V. Brown, National Petroleum Council; Austin Cadle, Standard Oil Co. of Calif.; Paul D. Williams, Western Petroleum Refiners Association; Stark Fox, Oil Producers Agency of Calif.; Minor S. Jameson, Jr., Independent Petroleum Association of America; E. Madison, The Texas Co.; Albert J. McIntosh, Socony-Vacuum Oil Co.; Serge B. Jurenev, Continental Oil Co.; W. G. Moore, Gulf Oil Corp.; C. F. Parker, Union Oil Co. of Calif.; Cecil L. Burrill, Standard Oil Co. (N.J.); W. L. Leavitt, Standard Oil Co. (Ind.); H. N. F. Schwall, Shell Oil Co., Inc.; N. G. Dumbros, Ohio Oil Co.; C. V. Horky, Pure Oil Co.; and Fred Van Covern, American Petroleum Institute.



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New catalytic reformates road-tested by Ethyl Research

In choosing one of the important new reforming processes, or in planning the over-all refinery operations once the plant is on stream, it is vital to know how the reformate will behave in the gasoline to be marketed.

That's where we can help you. Ethyl's Refinery Technology group in Detroit, working closely with the developers of these new processes, has prepared several reports on road antiknock behavior of reformates. And more reports are in process.

Each of these Ethyl reports is based on evaluation of reformate samples from commercial units or from the developer's pilot plant. We blend the new reformates with typical refinery base stocks—straight-run, catalytically cracked, and thermally cracked naphthas—to produce typical gasolines. "Ethyl" antiknock compound is then added, and the gasolines are road-tested on chassis dynamometers in our controlled-weather rooms.

Finally, all the information is collected, evaluated and submitted for approval to the developer of the process.

Reporting to the industry on the behavior of catalytic reformates is another example of how Ethyl is helping to serve your needs.

If you have a problem in octane improvement, get in touch with your local Ethyl Refinery Technologist. He'll be glad to work with you.

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1600 West Eight Mile Road, Ferndale 20, Michigan
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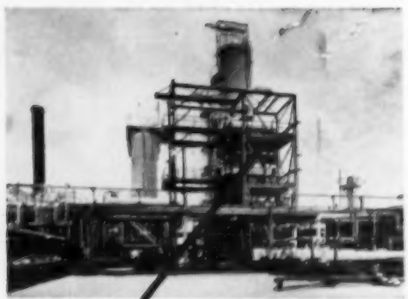
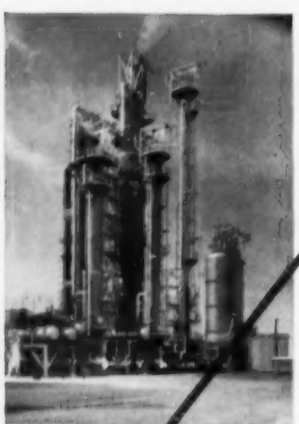
Another Complete Refinery



CRUDE UNIT: capacity 10,000 barrels per calendar day.

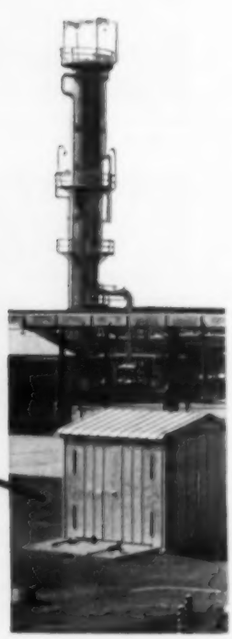
DELAYED COKING UNIT: 2,500 barrels a day reduced crude; produces approximately 74 tons a day of coke.



CATALYTIC CRACKING UNIT: capacity 7,000 barrels a day of total feed.

CATALYTIC POLYMERIZATION UNIT: capacity 1,700 barrels a day of mixed $C_3 - C_4$ stream.

CATALYTIC REFORMING: 3,500 barrels a day of heavy naphtha.



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Built for The Texas Company at El Paso, Texas, this new integrated refinery consists of crude and delayed coking units, as well as units for catalytic cracking, polymerization and reforming.

To companies the world over that now are contemplating new refinery expansion, Foster Wheeler offers the significant advantages of its worldwide experience in the design, engineering and construction of completely integrated refining facilities. For proposals to meet your specific requirements, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

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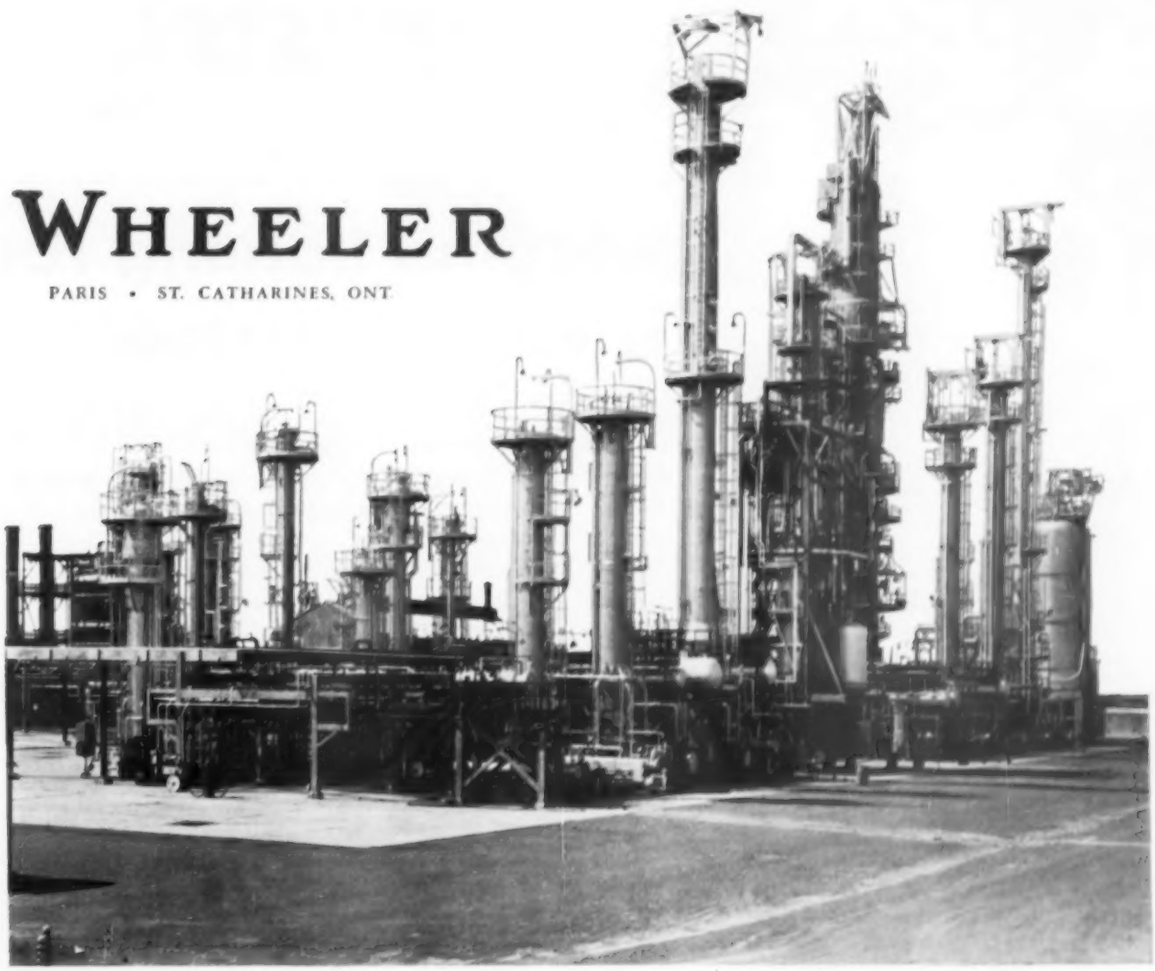

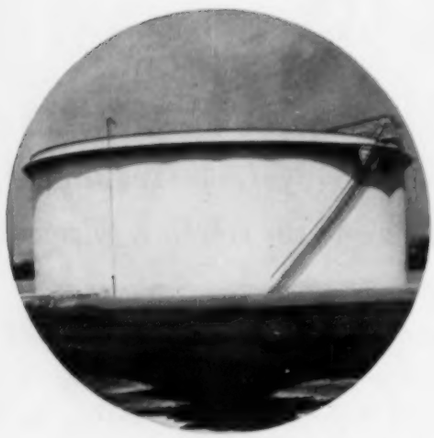

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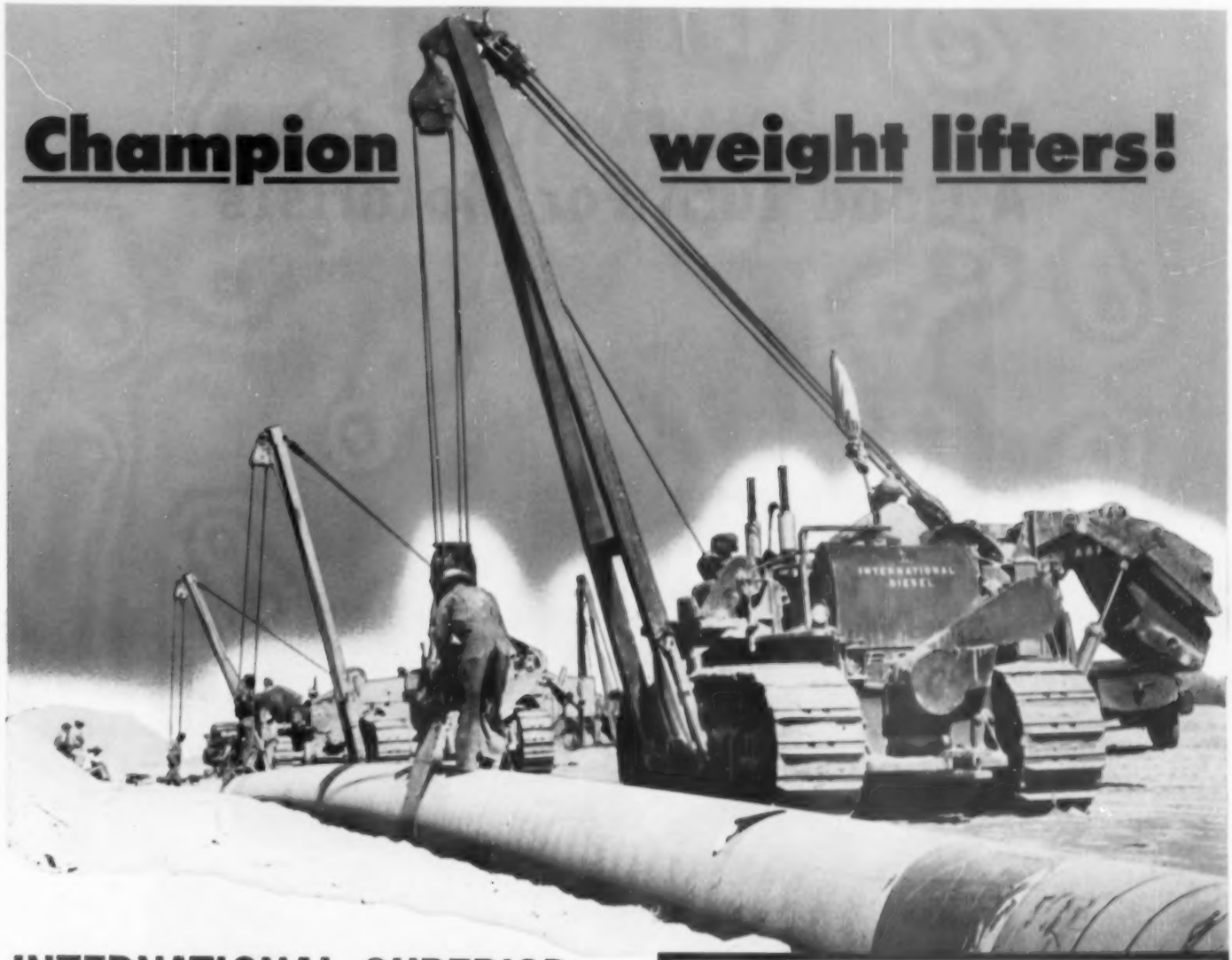

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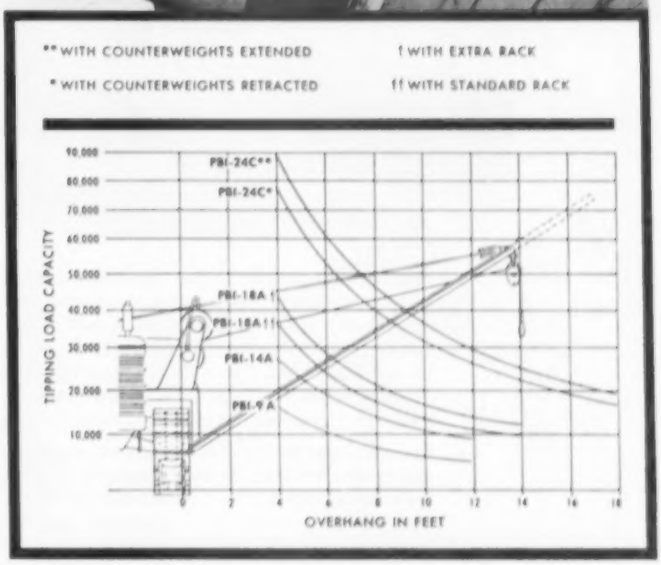

A size for every job! Whether your pipeline project is a small water line or a giant big-inch gas line, an International tractor and matched Superior pipeboom can do it better. The chart above shows the range of capacities...from the husky PBI-9A to the weight-lifting champion PBI-24C.

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No valve maintenance after 3 years' service —even with traces of HF acid

THE CASE HISTORY—This installation is at Continental Oil Company's Ponca City refinery, on their HF alkylation unit.

The service is on the debutanizer reflux drum water draw, with traces of hydrofluoric acid present at times. Working pressure is 100 psi. at 120° F.

The Crane valves on this service —No. 3609A, 600-pound small steel valves with Monel trim—were installed more than 3 years ago. Operating cycle is 4 times per shift around the clock.

Needing no maintenance whatsoever since installed, these valves have always made tight closure with smooth, easy operation. They show no leakage nor corrosive effects while continued safe and satisfactory service indefinitely is indicated.

No. 3609A Crane steel gate valves have a long, outstanding service record on HF alkylation units. They are recommended specially for anhydrous hydrofluoric acid, and where mixtures of the acid and hydrocarbons are found. Crane Monel trim combined with features such as extra deep stuffing box with spacer for lubrication, and male-female bonnet joint with soft iron gasket, assures finest performance from these valves. In gate and globe patterns; sizes up to 2 in., with screwed or flanged ends. See your Crane Represenative for valuable help in specifying and ordering.

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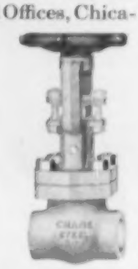

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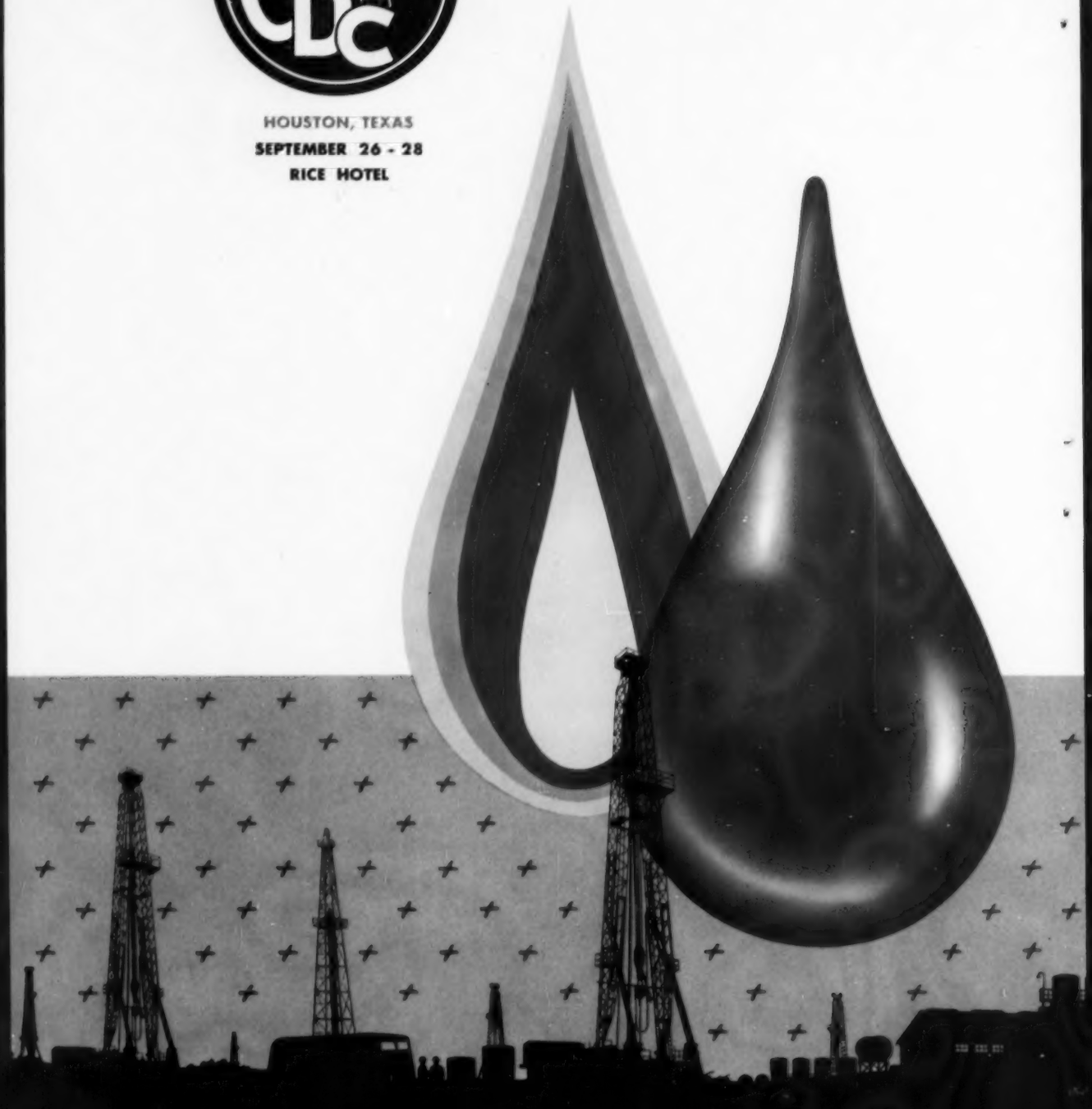
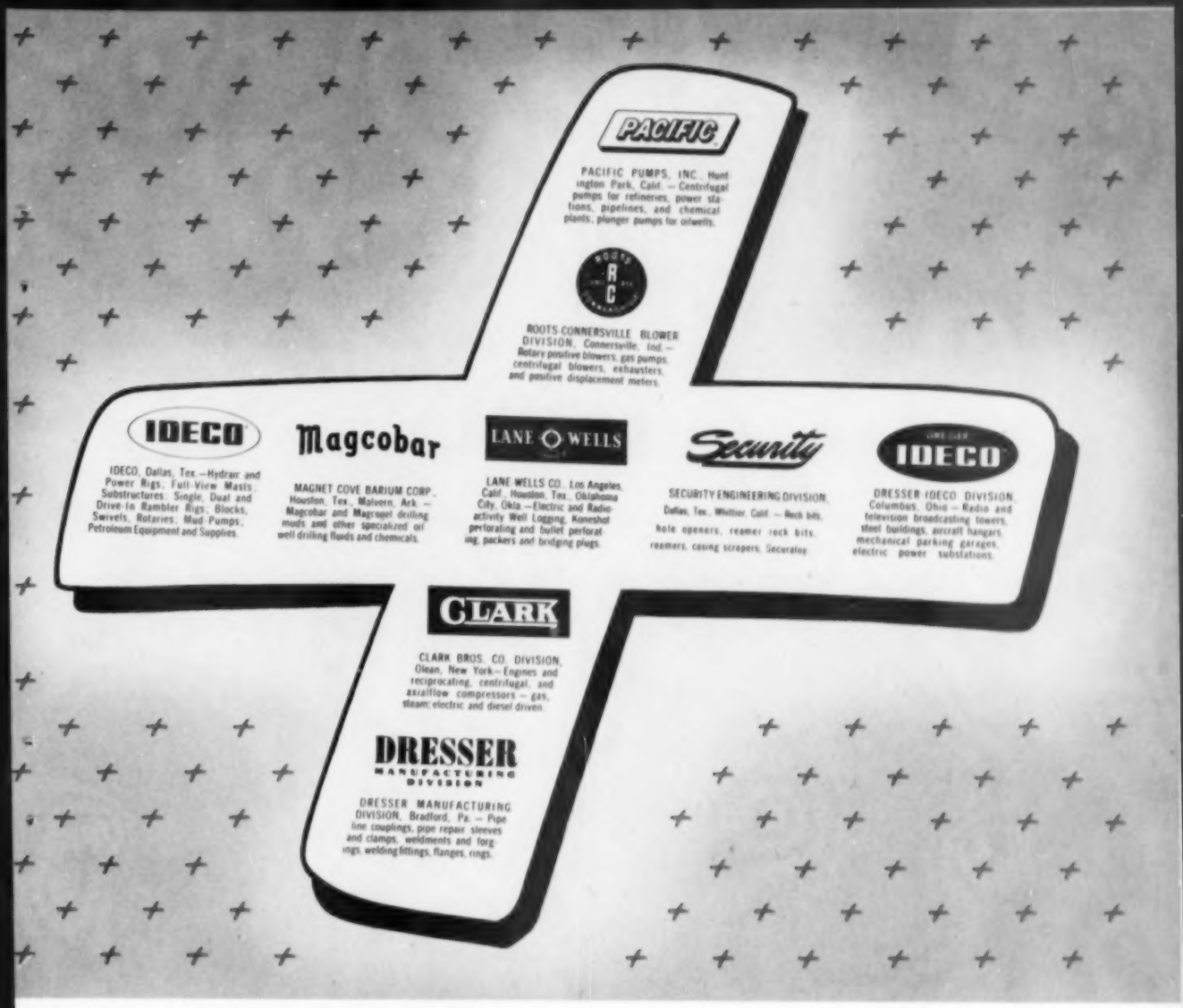


OIL AND GAS–BASIC ENERGY FOR AMERICAN PROGRESS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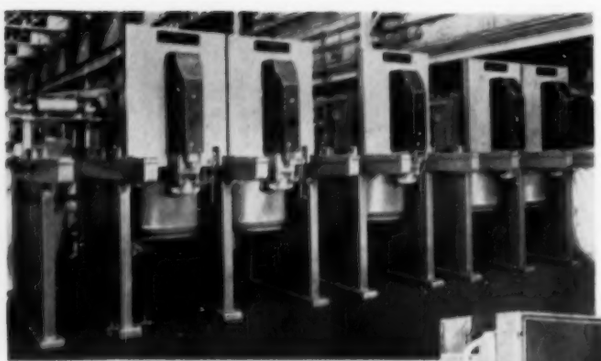
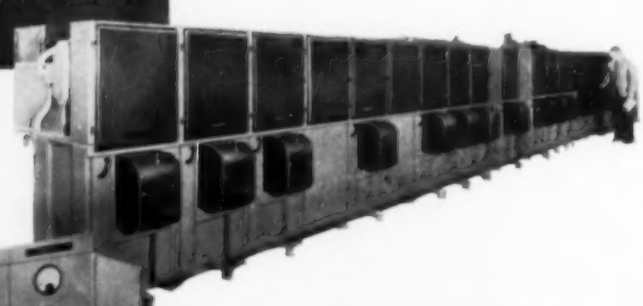
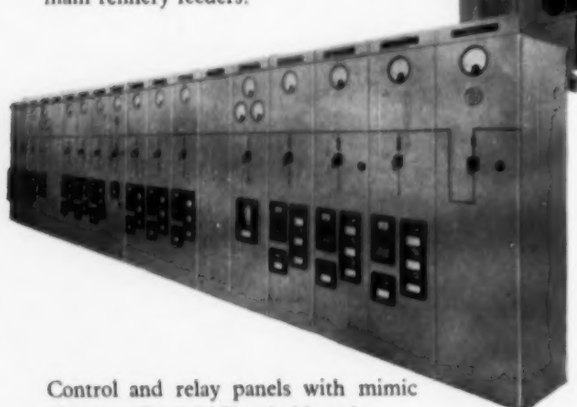
The Burmah-Shell Refineries Ltd. specified BTH 22-kV and 6.6-kV metalclad switchgear for their new Bombay Refinery.



Five-panel, 22-kV, 500-MVA solenoid-operated switchboard for the control of the incoming feeders (from the Tata Power Co., Ltd.) and 7,500-kVA transformers which supply electric power to the whole refinery.



Twenty-panel, 6.6-kV, 250-MVA solenoid-operated switchboard controlling the 7,500-kVA transformers and main refinery feeders.



Control and relay panels with mimic diagrams for 6.6-kV switchboard.

Manufacture is now proceeding with a further two 22-kV, and nine 6.6-kV, units for a third 7,500-kVA transformer and additional refinery feeders; BTH have also supplied a total of eighty-three 6.6-kV, 150-MVA hand-operated metalclad switchgear equipments for the refinery substations.

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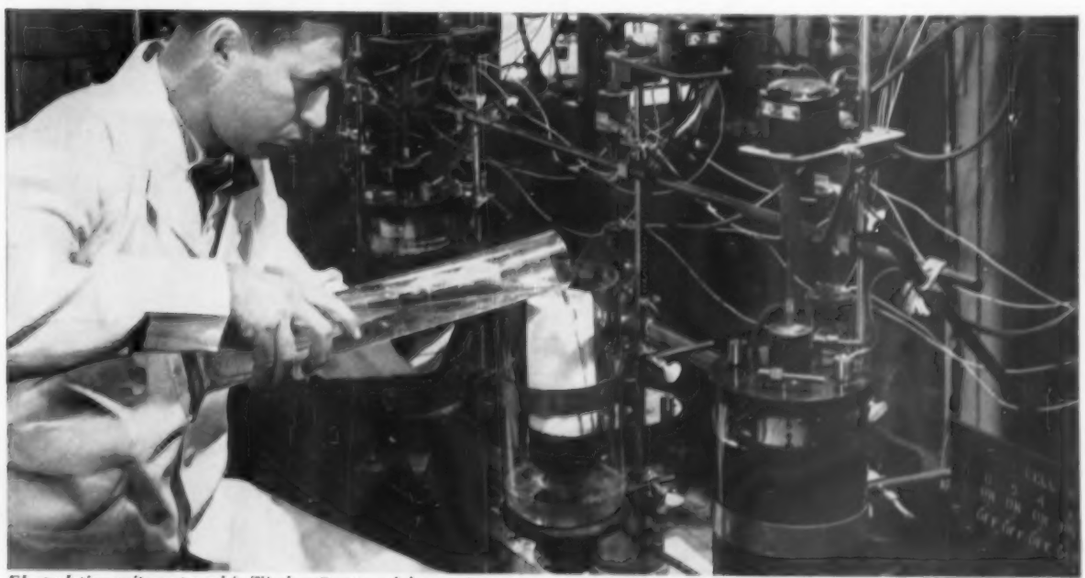
Let the Timken Company's metallurgists help solve your tube problems. *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Electrolytic equipment used in Timken Company laboratories to extract non-metallic inclusions from steels in research on steel cleanliness

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

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WITH
Rexfo
TRADE

To meet the increasing demands for higher octane gasolines, Aurora Gasoline Company is installing facilities for the operation of the UOP Rexforming process—the first commercial installation of this newest catalytic reforming process.

The new facilities, to be installed at Aurora's Detroit, Michigan, refinery, will produce a high-octane blending component for the company's gasoline outlets. It is expected that the Rexforming unit will be placed in operation within the next five months.

The Rexforming process, capable of producing gasolines with octane ratings in excess of 100 clear, was developed by Universal Oil Products Company to provide the entire petroleum refining industry with a tool which will permit them to keep pace with the requirements for high octane motor fuels.

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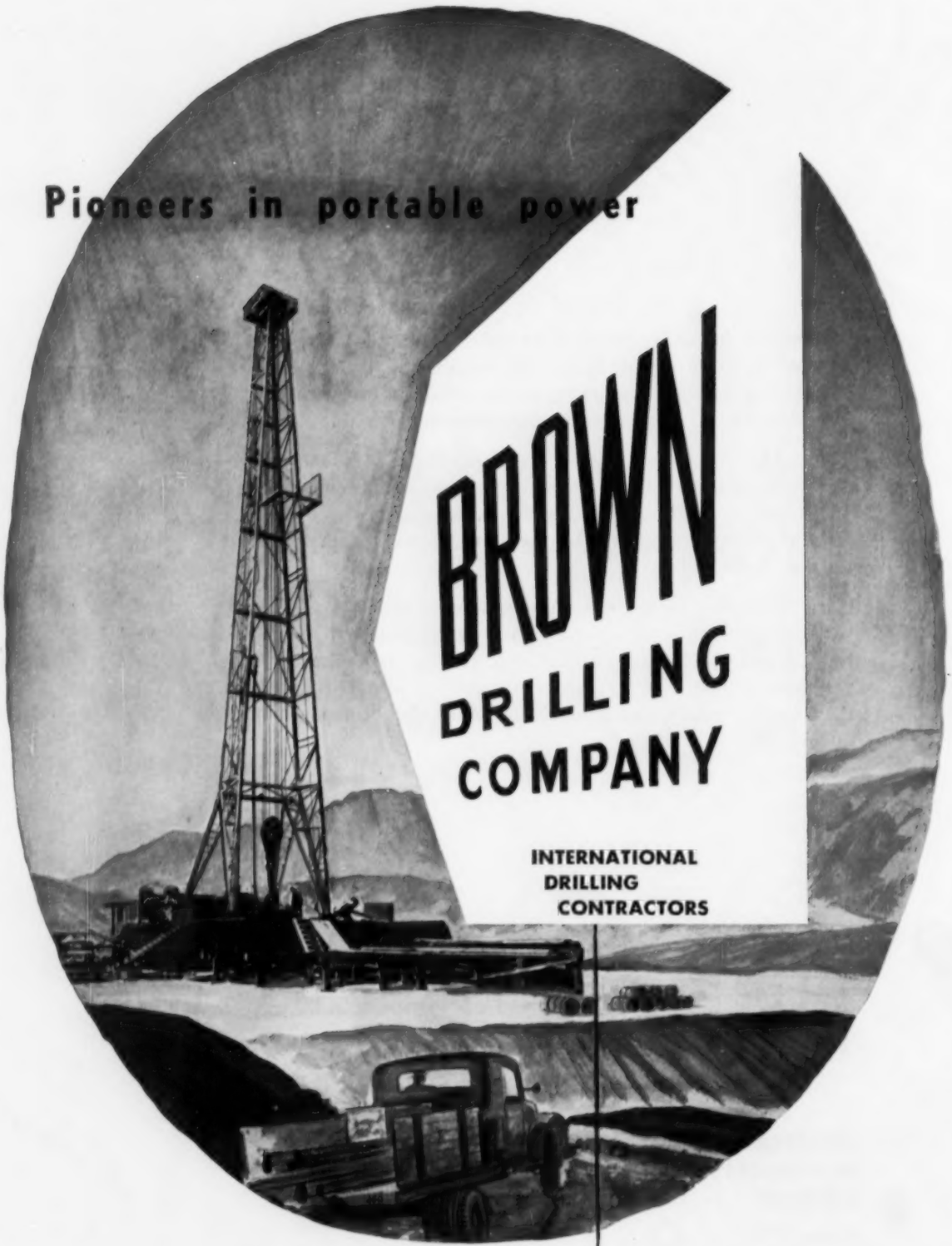

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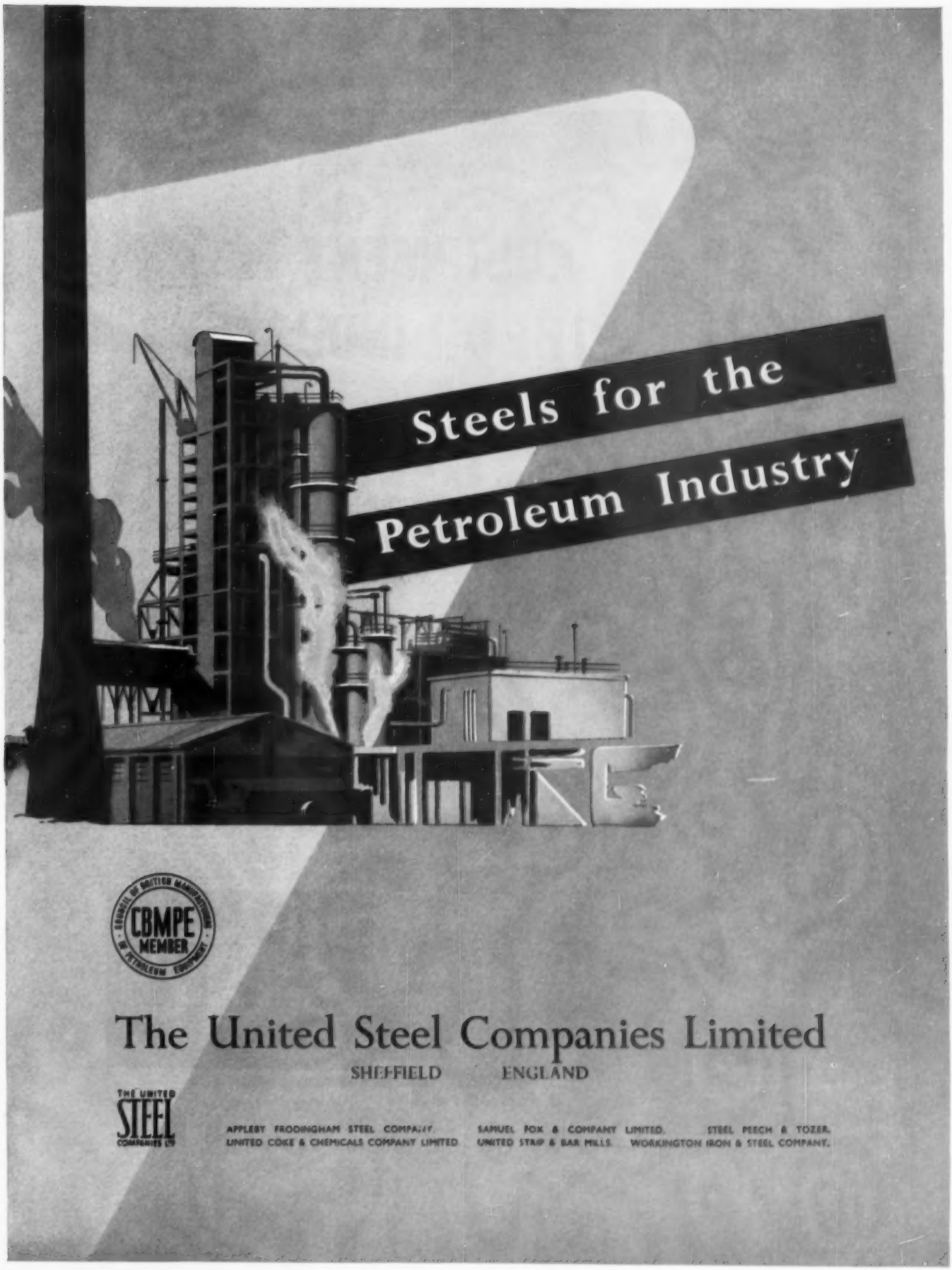
Steels for the
Petroleum Industry
COUNCIL OF BRITISH MANUFACTURERS OF PETROLEUM EQUIPMENT
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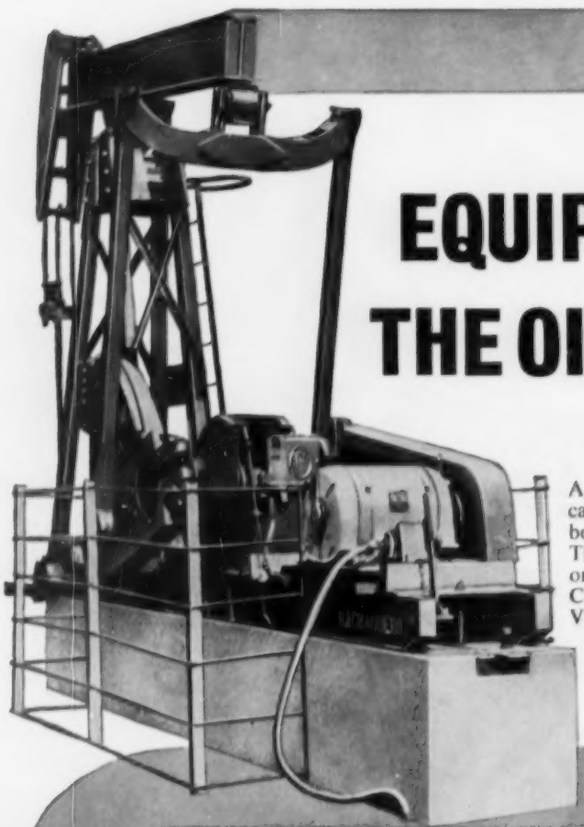
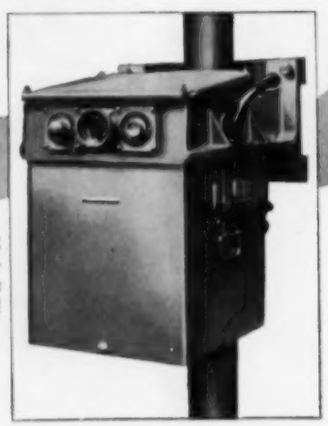
EQUIPMENT FOR THE OIL INDUSTRY

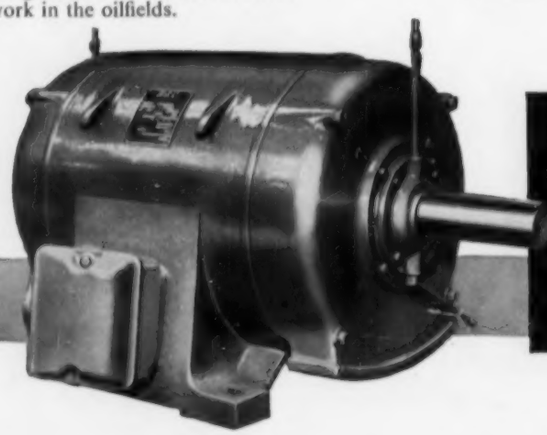


A high torque squirrel cage motor driving a beam type well pump. This installation is on one of the oilfields of Compania Shell de Venezuela.



A combined circuit breaker and contactor starter for the automatic control of oilwell motors.

A G.E.C. weatherproof motor designed and built for arduous work in the oilfields.



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CRANPAC STYLE 100 AL A metallic gland packing, constructed with aluminium foil. This packing is designed for use in centrifugal and reciprocating pumps handling petroleum distillates at temperatures up to 1000°F. It is especially suitable for services associated with hot oil cracking and other refining processes.

CRANPAC STYLE 110 MP A resilient metallic packing constructed with soft frictionless foil which is machine-wrapped and crimped around a suitable core. This is a gland packing which is used extensively on all types of rotary and reciprocating pumps handling air, water, oil, hydrocarbon distillates and ammonia at temperatures up to 450°F.

CRANPAC STYLE 810 SP A packing constructed by braiding white asbestos yarn. This particular packing is impregnated with a special petroleum solvent-resistant lubricant.

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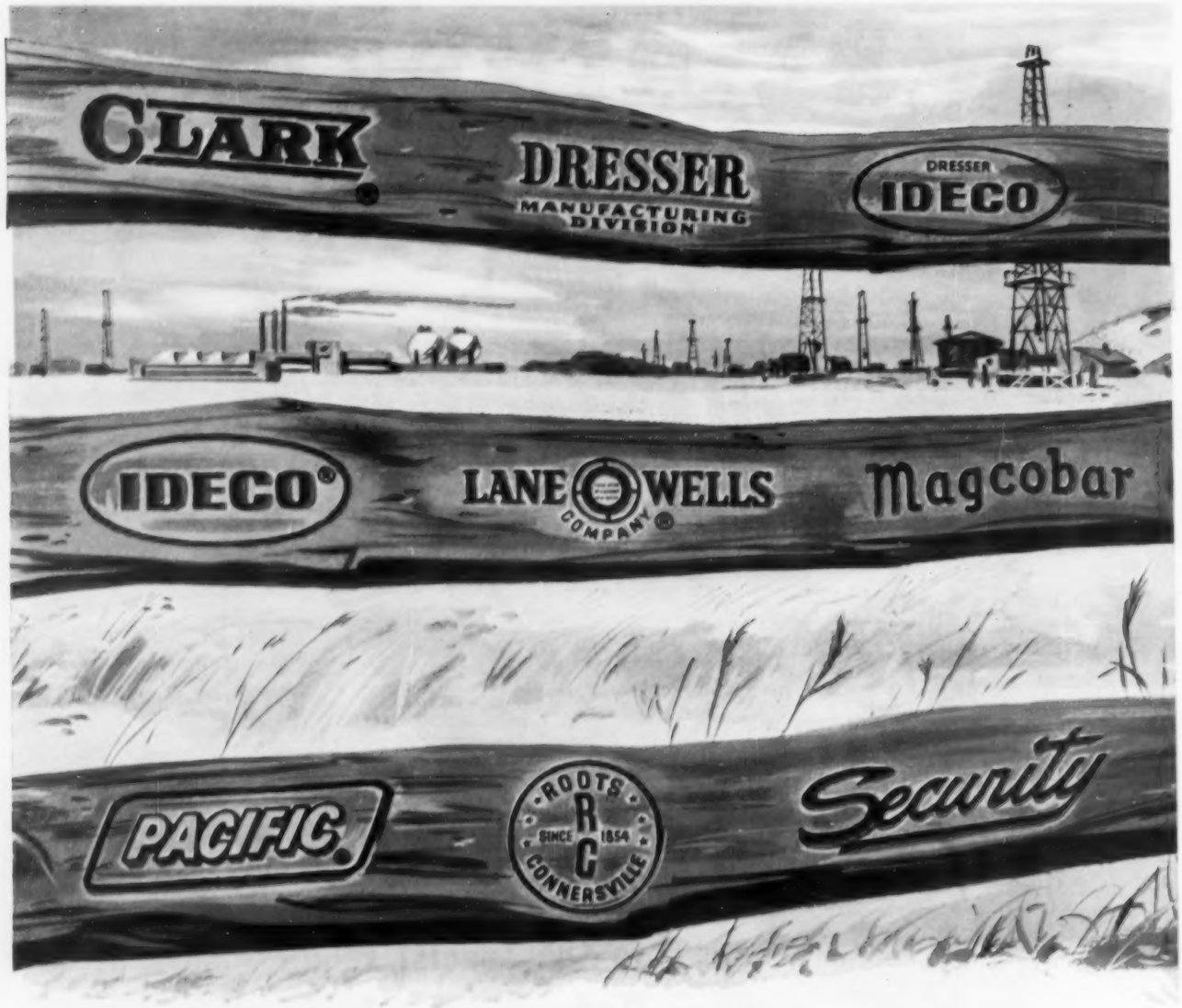

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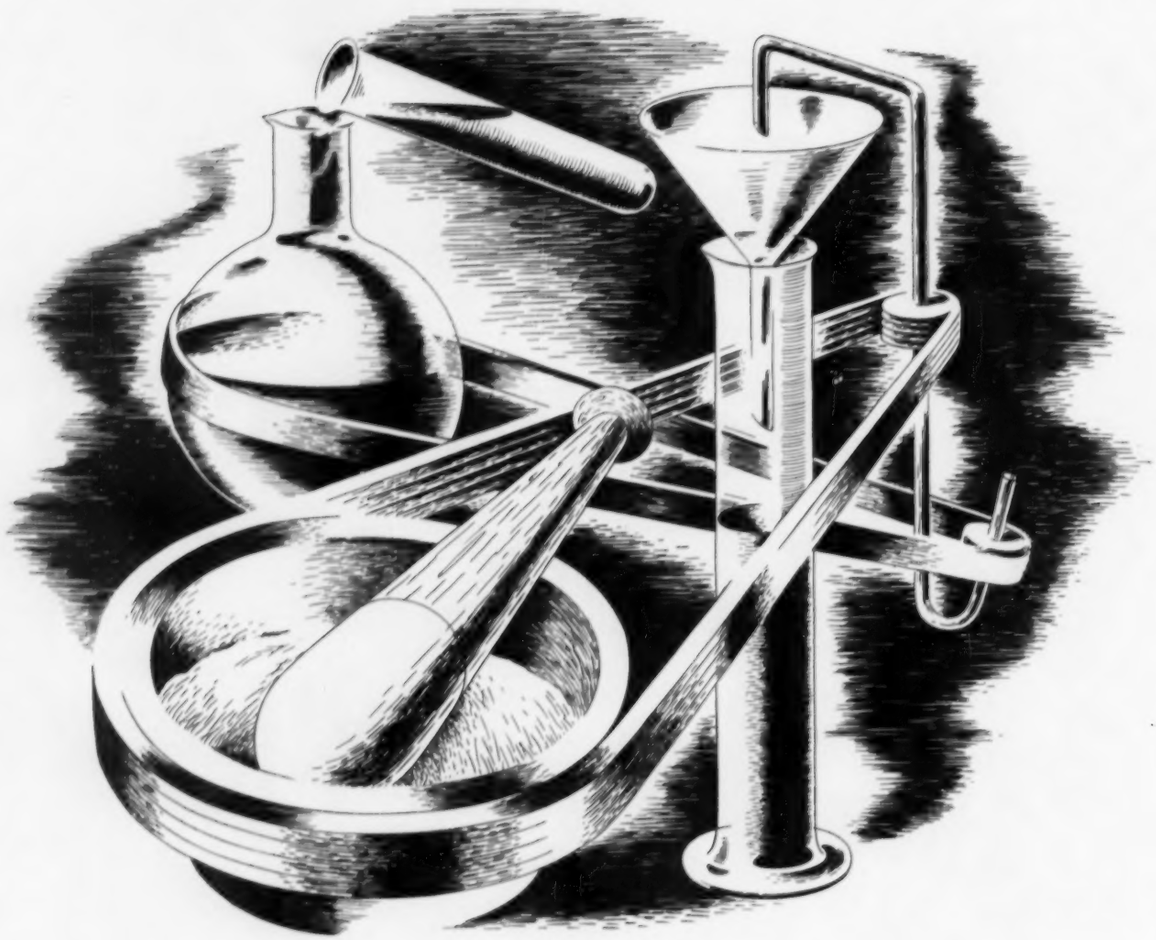

$(C_5\ H_8)\ x$ The layman will not recognise this formula but to the scientist and the technician it is one of the most important symbols in industrial chemistry. $(C_5\ H_8)\ x$ is the formula of rubber; unique, adaptable and indispensable rubber.

Within industry, rubber carries the load, transmits power and safely channels acids, oils and alkalis. Beyond industry rubber is in daily use by the surgeon, the housewife, the dentist, the airman and the nurse.

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Photograph by courtesy of Messrs. E. B. Badger & Sons Limited and British Petroleum Co. Limited.

This stripping tower, constructed to API. ASME, Code is an example of the type of work which Newton Chambers undertake for the oil industry at home and abroad.

From THORNCLIFFE

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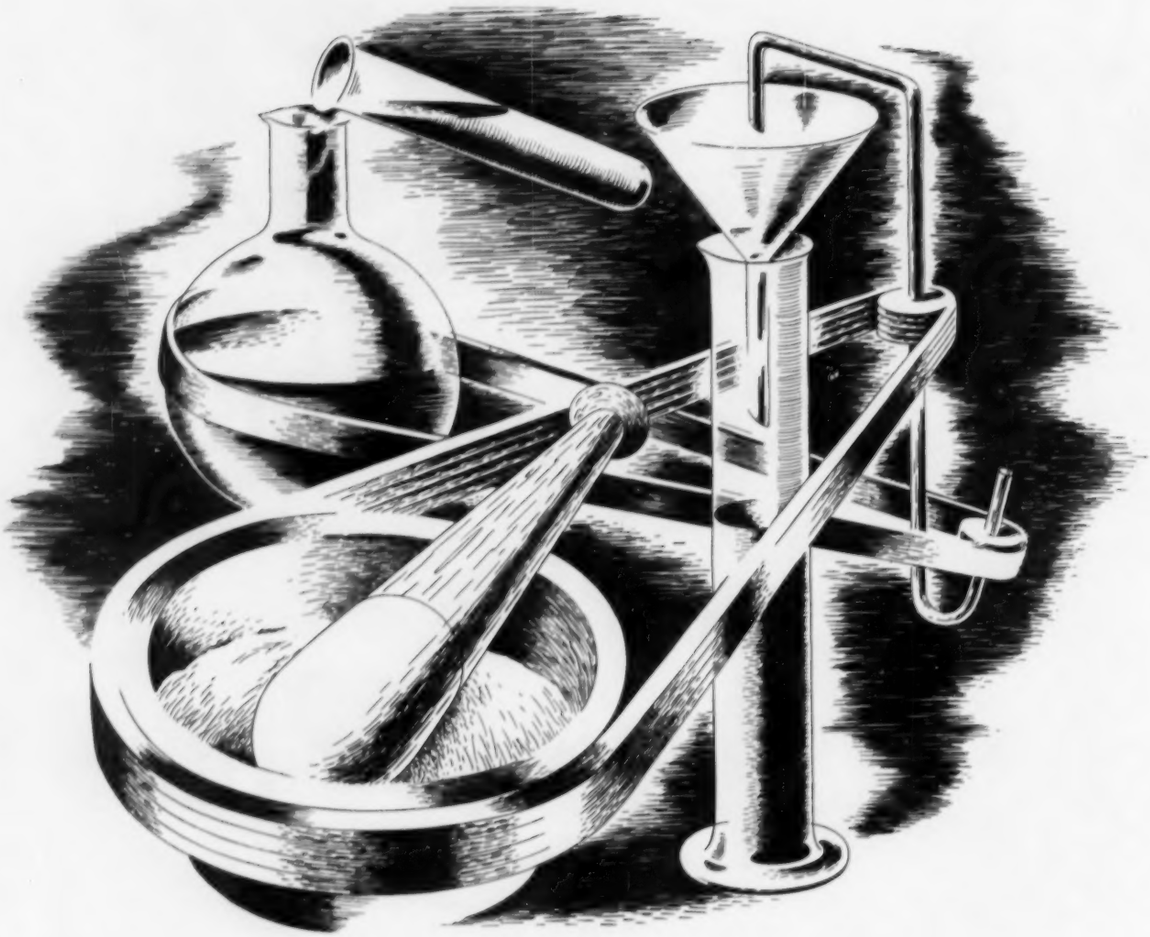

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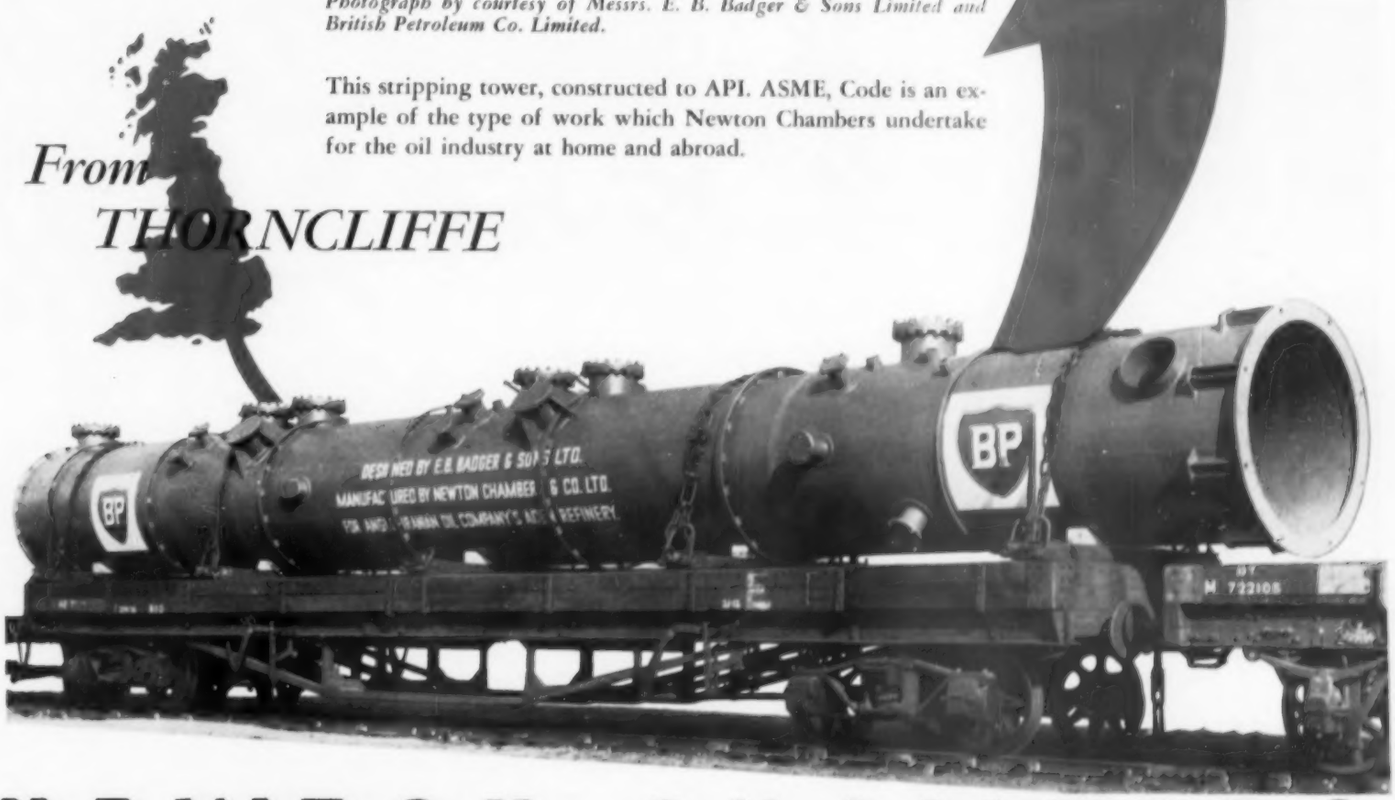

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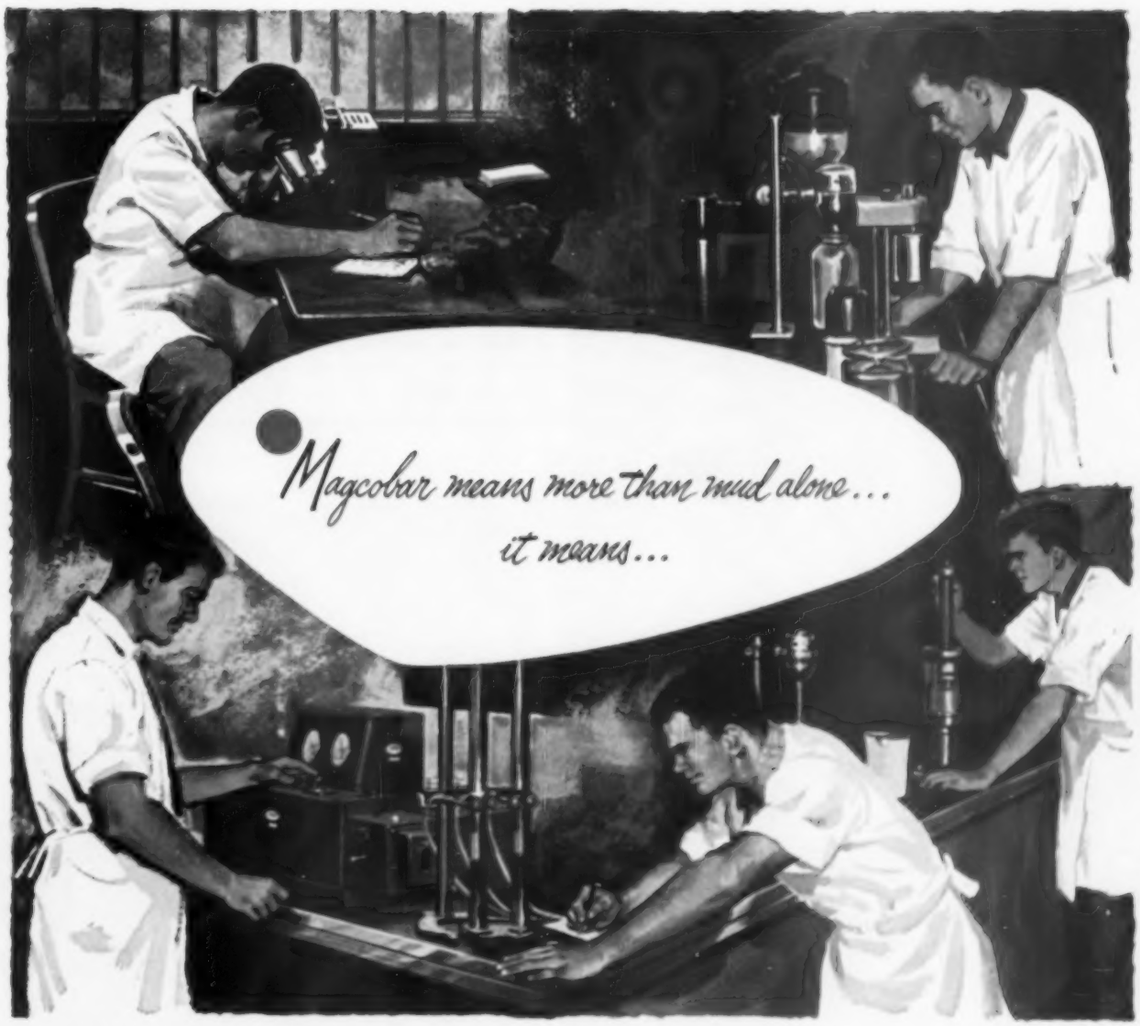

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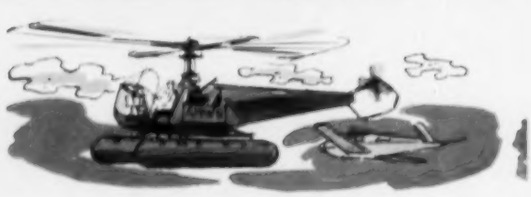

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—From an address by M. J. Rathbone, President, Standard Oil Company (New Jersey)

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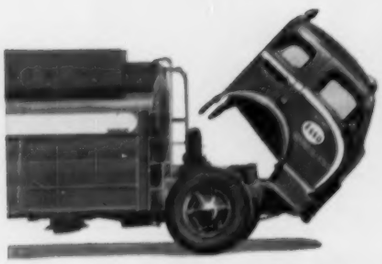

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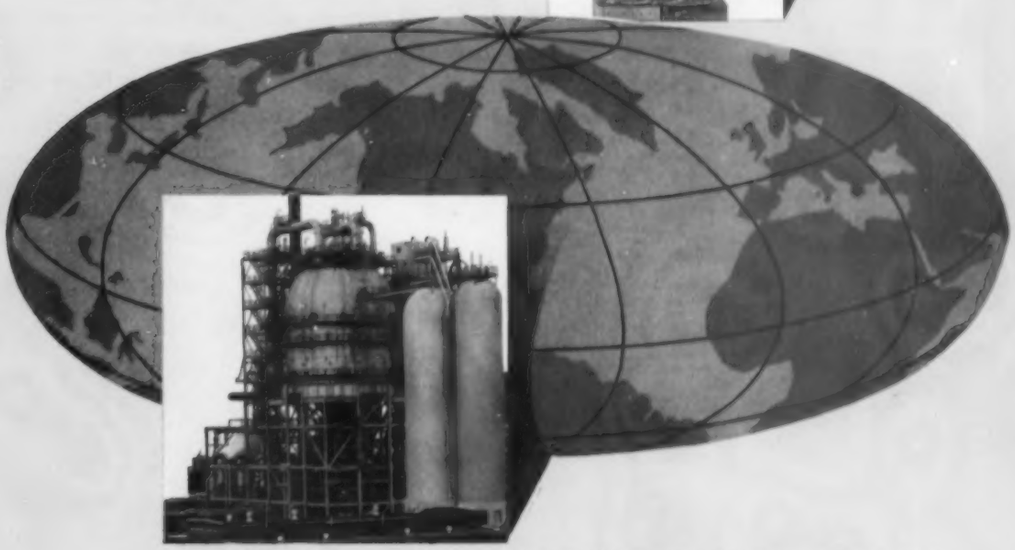

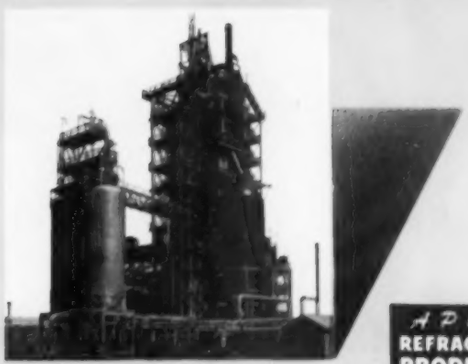

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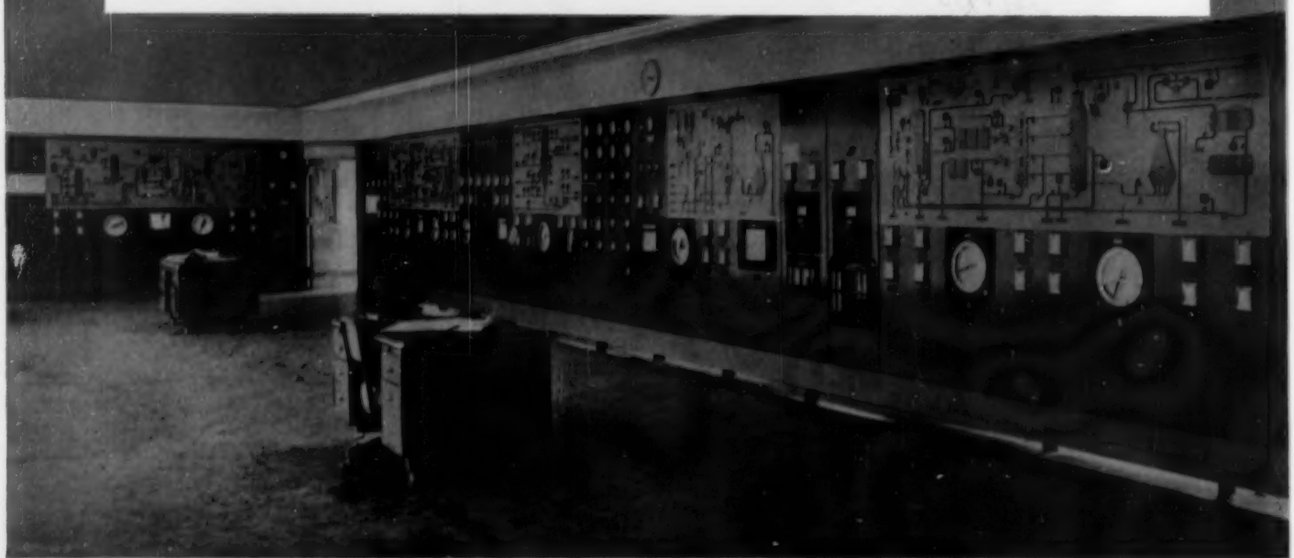

Control room of North Star Oil Limited refinery, St. Boniface, Manitoba—built by The Canadian Kellogg Company, Limited.

KELLOGG

REFINERY PROCESS DIVISION

THE M. W. KELLOGG COMPANY

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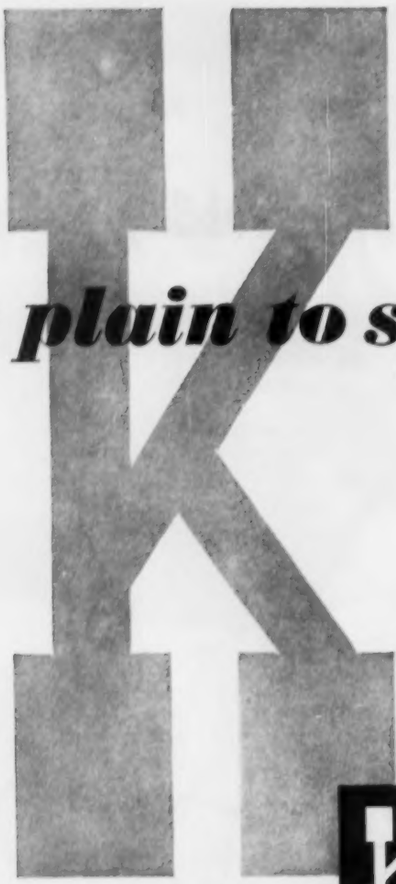

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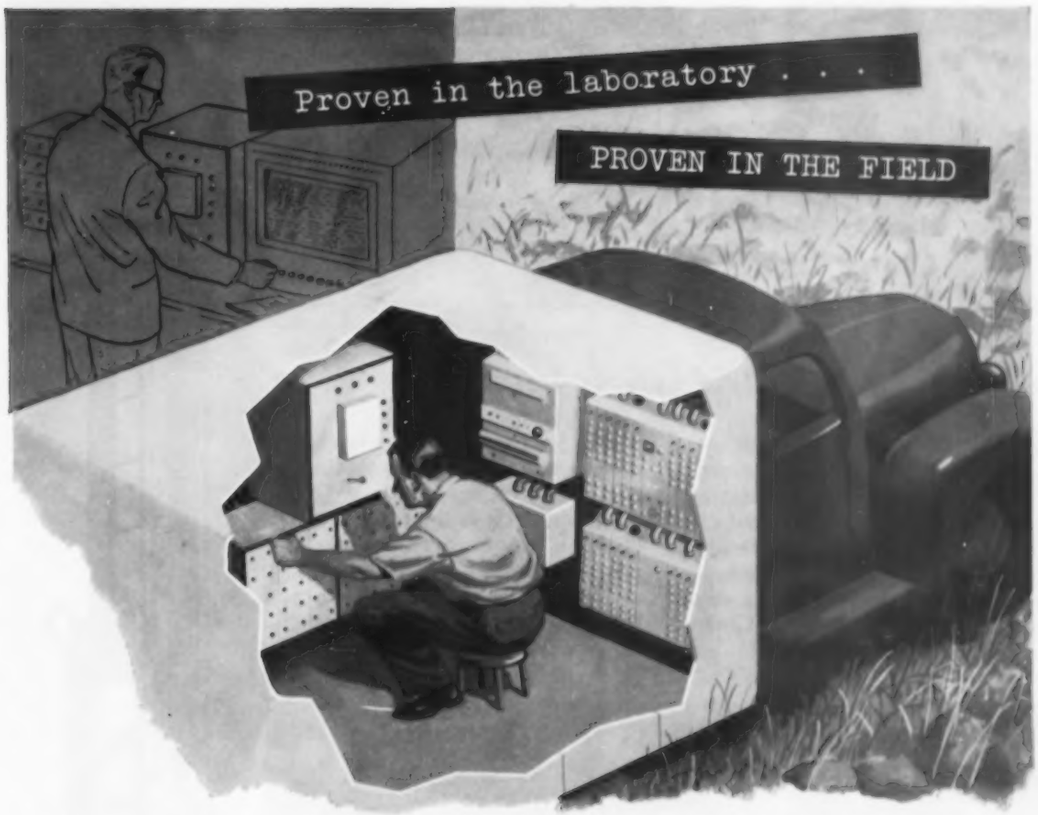

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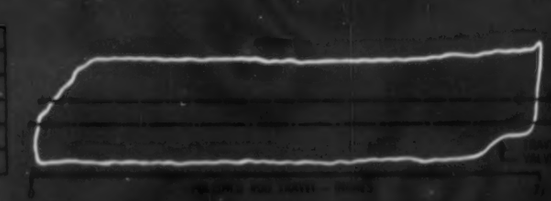

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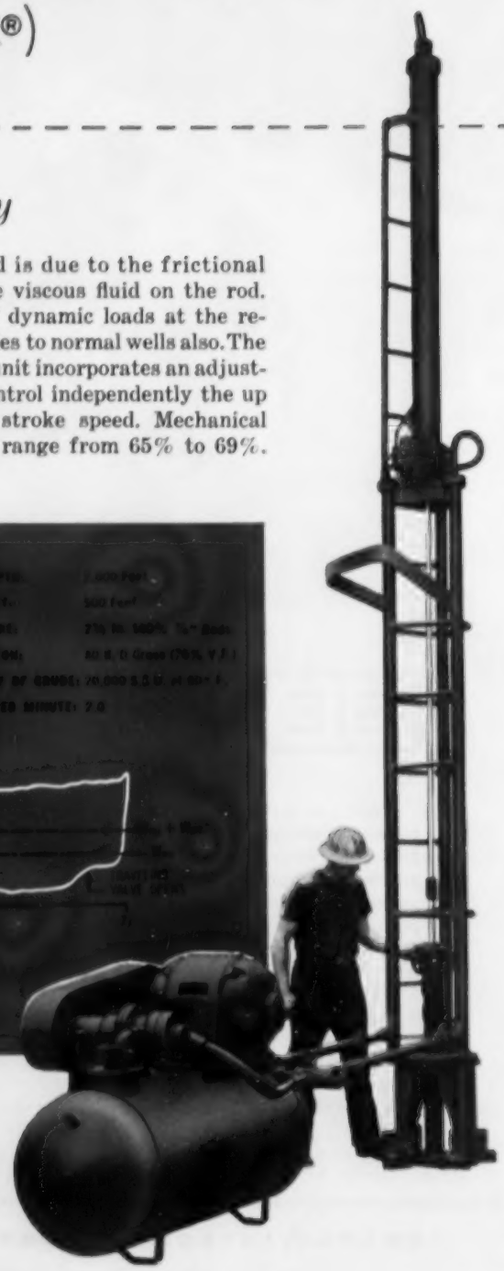

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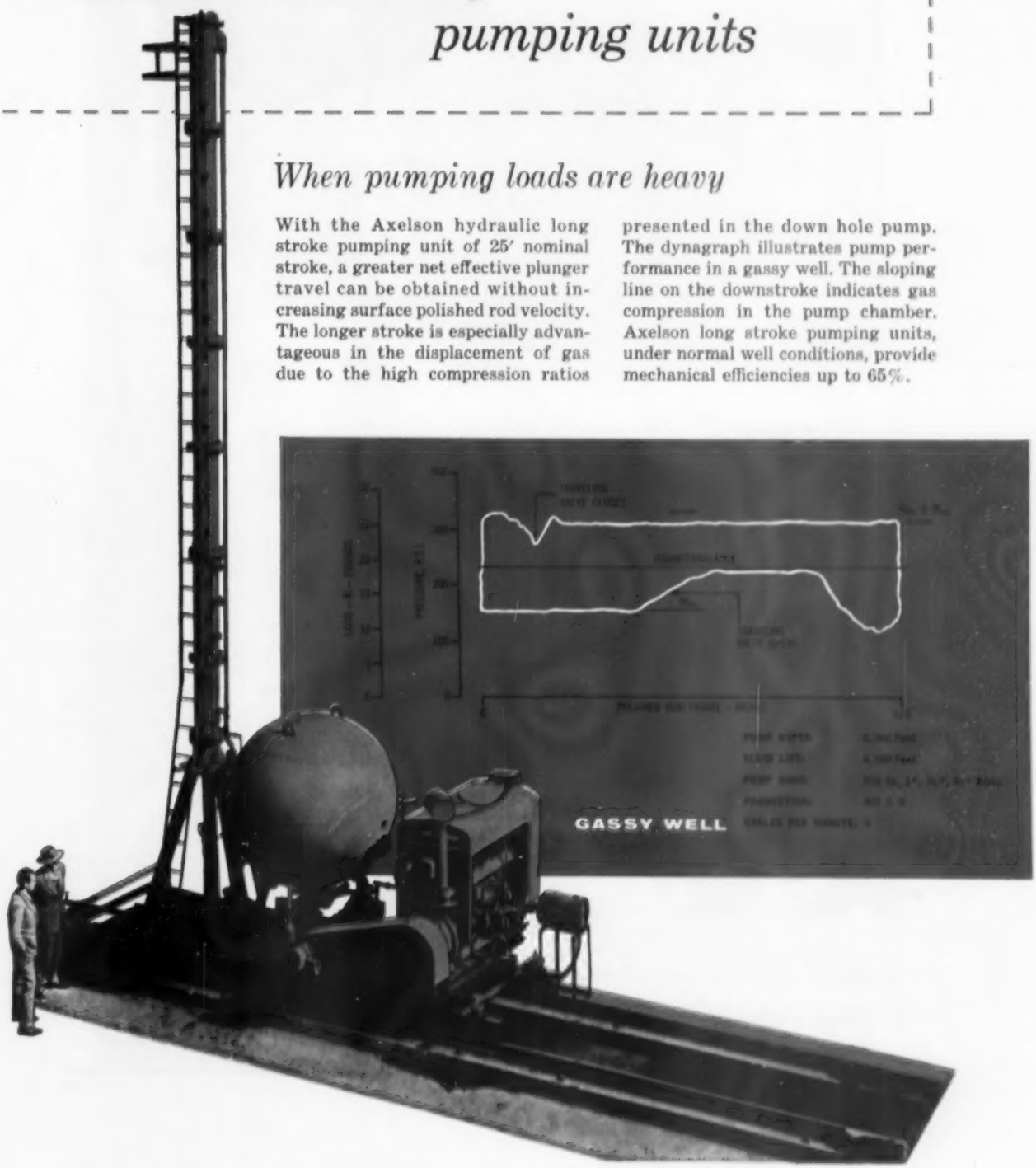

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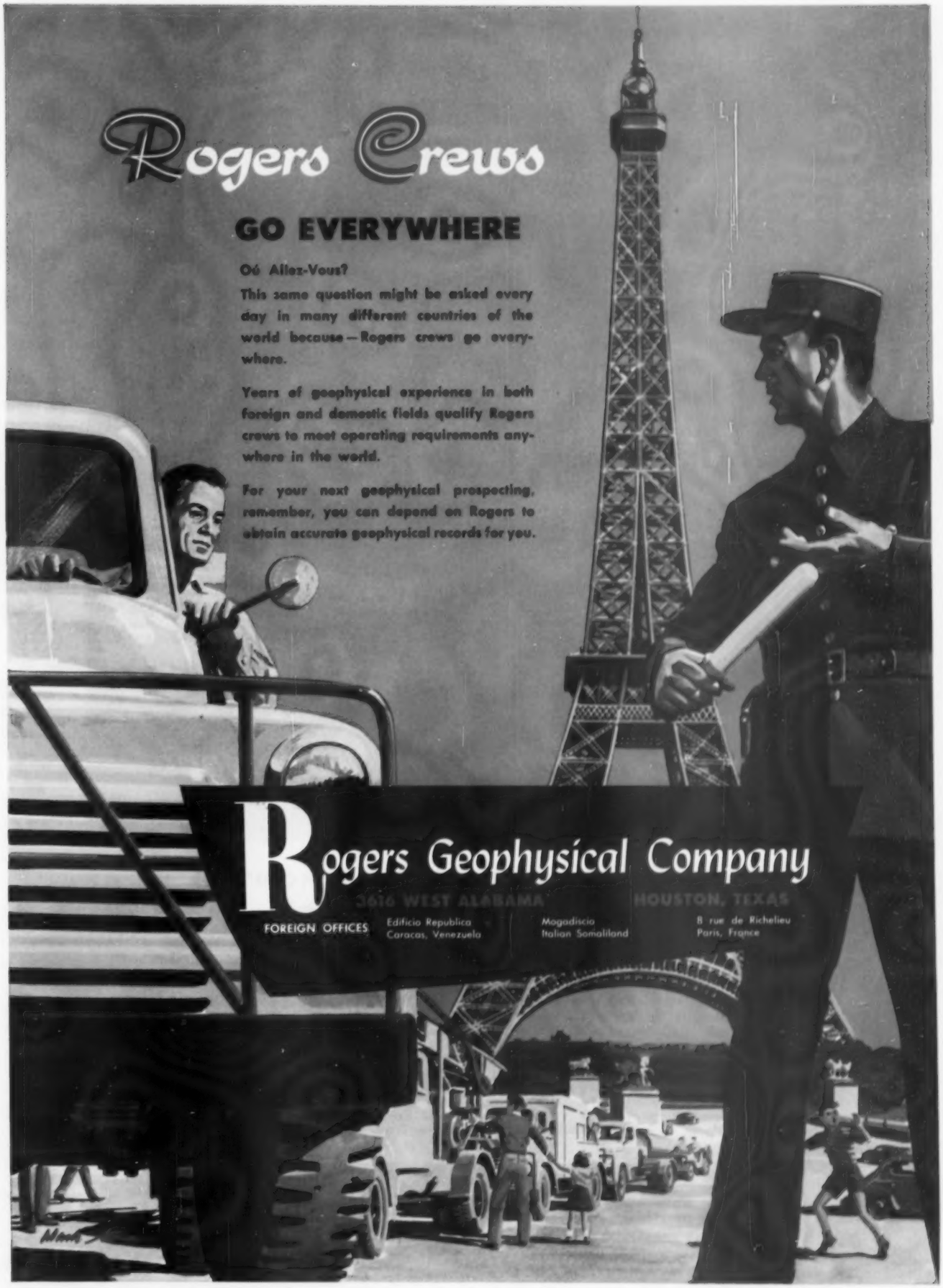
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VOL. 26, NO. 10, SEPTEMBER, 1955

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THIS MONTH'S COVER

A drilling well on Bahrain Island in the Persian Gulf. For the past eight years output of the field has been steady at about 30,000 b/d from the Cretaceous found at 2,000 to 2,500 feet, and the Jurassic at about 4,500 feet. Color plates are reproduced through the courtesy of Bahrain Petroleum Co. Ltd. which also operates a large modern refinery on the island.

PAY ZONE···of a Service Policy

HALLIBURTON
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The Iranian Experiment

On August 5, 1955, exactly one year had elapsed since the signing of an agreement which opened the way for Persian oil to return to the markets of the world after virtually complete suspension of operations for more than three years. As an industrial undertaking, the settlement remains unique because of the many diverse and apparently irreconcilable problems involved, its important political aspects and the fact that the views of three separate states had to be consulted and reconciled.

Viewing the situation in retrospect, it appears that complete disruption of the industry was unavoidable before a workable outcome could be considered. The campaign against the Anglo-Iranian Oil Co. whipped up a degree of nationalistic fury against foreigners that no possible offer could have offset. Dr. Mohammed Mossadeq and his followers, totally ignorant of conditions governing the oil industry, were committed to the naive belief that Persian oil was so much in demand by the world that once the British were driven out, purchasers would come flocking to their ports to obtain it on whatever terms might be demanded. Even when this dream had faded, the agitators were not willing to modify their course. It was only when excess of zeal led them to attempt the overthrow of their government that a revulsion took place which swept them out of power.

At that point the possibility of injecting new life into the inert Iranian industry appeared virtually hopeless. Through growing production and heavy investment in other countries, former markets had disappeared. The world had no need for Persia's oil and apparently no room for it. Feeling within the country against the British company was still so strong that restoration of its former position was impossible.

During the long period of stagnation that followed the expulsion of the British company, suggestions had been advanced in various quarters that some wholly outside interest should be placed in charge of the operation of the industry under agreement with the Iranian government, but none of these seemed to meet the requirements of the situation or the demands of the Iranians. Obviously no single oil company would be willing to assume the responsibility of such an undertaking or the risks that it involves, but it was felt that a group of strong international companies might succeed in such a task.

Obstacles in the way of forging a workable scheme were formidable. American companies were mindful of the stringent laws of their own land against limitations in competition and felt that it was essential that they should act individually in handling and marketing any part of Iranian production for which they might assume responsibility. The problem of meeting the British company's claims for loss of its property and rights, for which the Iranians showed no willingness to make adequate compensation, offered another complication. Nevertheless, some form of group action seemed to offer the only possibility of providing the strength and resources necessary and this was the starting point for the intensive study of the puzzle carried on at meetings in London, Washington and Teheran.

If one seeks to learn the inside story of the negotiations leading up to the solution of the seemingly insolvable situation, he learns that there is no such story. No flash of genius revealed the answer to a hundred complex questions. No single person or small coterie was responsible for working out a full system of operation. This was accomplished by a group of hard headed, pragmatic minded business men, who tested every proposal by the question of its workability and the degree of protection it provided for the interests of all involved. Aided by the sympathetic interest and advice of public officials whose names are closely associated with the whole undertaking, the result was a work of practical statesmanship which invites admiration and stands without parallel.

In its first year of operation the program laid down has been followed closely and has worked smoothly, fulfilling the specifications laid down as to the quantity of oil to be produced in the initial period. At the same time, distribution has been accomplished without any disturbance in market stability. Fortunately, it was found that neither the wells nor the refinery had suffered seriously from their enforced idleness, and in fact, pressures in some fields had shown improvement during the suspension of operations. Good will and practical cooperation has marked relations between the operating staff and the local authorities. From all indications, the Iranian experiment, boldly conceived and carefully formulated, promises to be a continuing success in helping to build a stronger economy and a more prosperous future for the Iranian people.

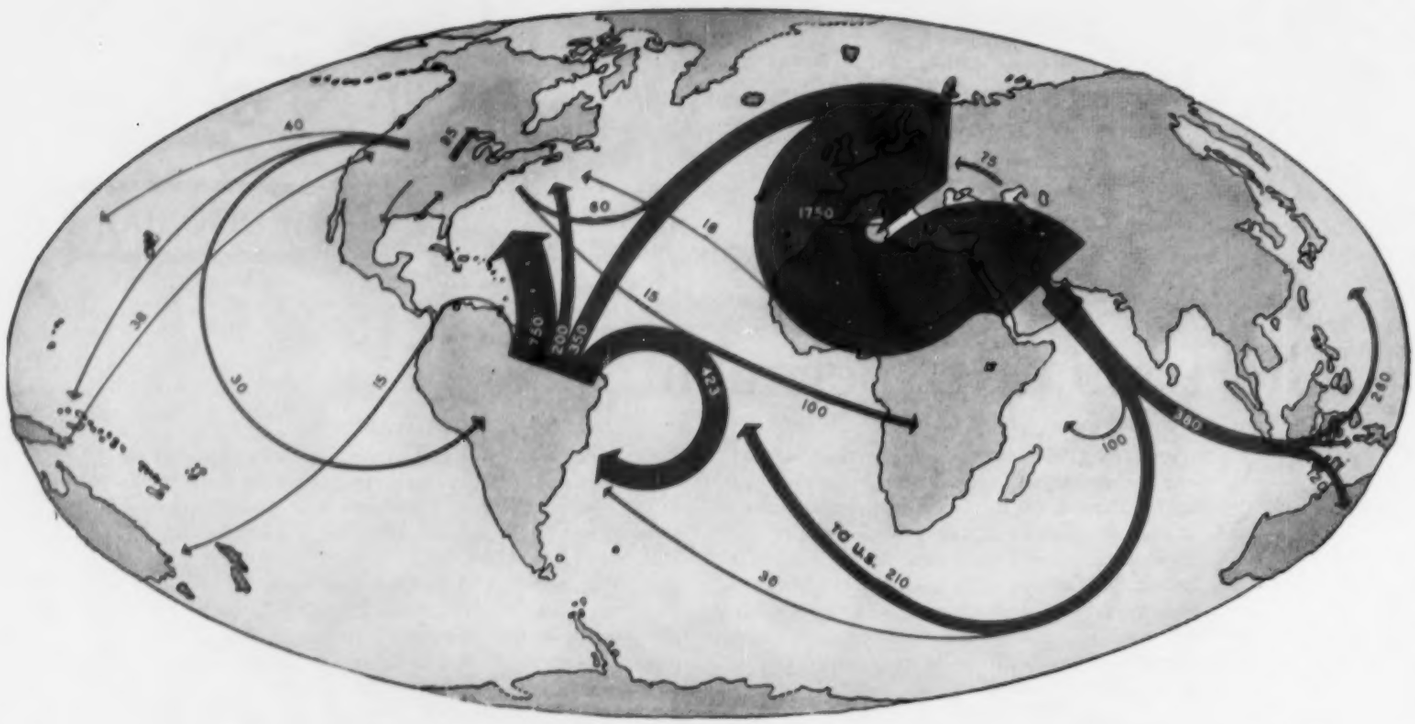


Chart indicating principal intercontinental movements of petroleum and products in 1954. Figures indicate approximate shipments in thousands of barrels daily. Arrows are not intended to show route followed, only origin and destination continents.

WORLD OIL CONSUMPTION 7.1% HIGHER

Demand for petroleum products in 1955 is expected to approximate 15,463,100 barrels daily. Consumption outside the United States probably will rise 7.8 percent.

WORLD DEMAND for petroleum in 1955 will exceed last year by 7.1 percent, according to estimates prepared on the basis of sales during the first half of the year. The increase will exceed a million barrels daily, bringing demand to 5,644 million barrels for the entire year, an average of 15,463,100 b/d. The figures include both crude and natural gas liquids which now constitute nearly six percent of the world's supply of petroleum and currently approximate 835,000 b/d.

In 1954, demand for petroleum totaling 5,270 million barrels was 6.2 percent above 1953, rising 863,000 b/d to 14,439,000 b/d.

Increases in various areas this year are somewhat more uniform than was the case in 1954 when the United States was in a relatively static period with a growth in domestic sales of only two percent. This year U.S. domestic demand was 7.3 percent higher in the first half year and is estimated by conservative observers at 6.5 percent higher for the year as a whole.

Outside the United States, demand is running 7.8 percent higher than a year ago. Eastern Hemisphere consumption is expected to exceed 1954 by 7.9 percent and Western Hemisphere demand may be up 6.9 percent.

Above-ground stocks of petroleum have been climbing during the first half of the year as production has increased at an even faster rate than demand. In 1954, stock accumulation totaled about 32 million barrels compared with 110 million barrels the previous year. Unless output of crude and natural gas liquids is restricted somewhat or demand is better than is now anticipated, the accumulation of inventories this year may reach 120 million barrels before the end of December.

Daily average world production of crude in the first six months was 14,907,300 barrels and natural gas liquids produced averaged 836,000 b/d, bringing total new supply of petroleum to 15,743,300 b/d. With estimated world demand running 15,463,100 b/d, it is indicated that stocks are rising at the rate of 280,200 b/d.

At the end of May, the U.S. Bureau of Mines reported an increase in total stocks

of petroleum in the United States of only 4,134,000 barrels. The industry was at that time just entering its period of major accumulation. Currently the Bureau is estimating that there will be no appreciable change in stocks during the year. This estimate is based on an increase in domestic production of six percent during the year.

World production of crude oil in the first half of this year was about 10 percent higher than in the first six months of 1954, the increase being 1,345,000 b/d. The growth in crude production was almost equally divided between eastern and western hemispheres. In the west, crude production was 655,000 b/d higher and in the east 690,000 b/d higher.

The Eastern Hemisphere is rapidly approaching self sufficiency in oil as a result of the continued expansion in Middle East production. In 1954 the deficiency was only 245,000 b/d. Indications are that this may drop to around 100,000 b/d this year.

An accompanying diagram shows the principal intercontinental movements of petroleum in 1954. The chart indicates that the most important change from 1953 was the growth in movement of Middle East oil to Europe. Average in 1954 was 1,750,000 b/d compared with 1,500,000 b/d in 1953. There was an increase in the movements from the Middle East to southeast Asia and Oceania of about 80,000 b/d and to Africa of 20,000 b/d. Shipments to the Western Hemisphere of about 258,000 b/d were approximately 10,000 b/d less than in 1953.

The Caribbean is the second largest crude producing area in the world with an exportable surplus. Excess supply last year was 1,800,000 b/d compared with 1,700,000 b/d in 1953. Greatest change in movement from the area was the growth in sales to the large consuming countries in southern Latin America. Southern shipments in 1954 rose 73,000 b/d to 423,000 b/d. Movement to Europe was steady at about 350,000 b/d and to Canada and the United States the total was 950,000 b/d, of which about 200,000 b/d went to Eastern Canada, an area into which it is still uneconomic to ship Western Canada crude.

With North American and European customers buying little more oil than in 1953, Caribbean producers were fortunate last year in having an active market in the southern part of the continent. Argentina and Brazil consumed 40,000 b/d more oil with little change in indigenous production. Local consumption in Colombia and Venezuela and in the nearby Antilles also was rising at a good rate. Result was that it was possible for Caribbean producers, notably in Venezuela, to dispose of 136,000 b/d more oil in 1954 than in 1953.

In the first half of this year Caribbean production has continued to rise at an even better rate. Output of crude and natural gas liquids is up about 245,000 b/d, or 11 percent over the first six months of 1954.

The United States has imported more heavy fuel as domestic refiners have continued to reduce their yields of residuals by heavier cracking and by coking. Brazil-

ESTIMATED WORLD CONSUMPTION OF PETROLEUM PRODUCTS

(Crude Equivalent Basis—Thousands of Barrels)

	1954		1955		
	Total	Daily Average	Total	Daily Average	Percent Change
Canada	198,049	542.6	215,642	590.8	+ 8.9
United States	2,829,426	7,752.0	3,013,440	8,256.0	+ 6.5
Mexico	80,592	220.8	85,227	233.5	+ 5.8
N. America	3,108,069	8,515.4	3,314,309	9,080.3	+ 6.6
Argentina	71,503	195.9	75,847	207.8	+ 6.1
Brazil	57,998	158.9	66,466	182.1	+14.6
Chile	10,987	30.1	12,082	33.1	+10.0
Colombia	15,075	41.3	16,863	46.2	+11.9
Cuba	19,162	52.5	19,929	54.6	+ 4.0
Netherlands West Indies	51,685	141.6	51,611	141.4	—
Peru	13,541	37.1	14,673	40.2	+ 8.4
Trinidad	14,126	38.7	14,527	39.8	+ 2.9
Uruguay	10,366	28.4	10,804	29.6	+ 4.2
Venezuela	44,858	122.9	48,326	132.4	+ 7.8
Central America	13,578	37.2	13,979	38.3	+ 3.0
Others	10,001	27.4	10,950	30.0	+ 9.5
S. America & Caribbean	332,880	912.0	356,057	975.5	+ 6.9
WESTERN HEMISPHERE	3,440,949	9,427.4	3,670,366	10,055.8	+ 6.7
Austria	10,439	28.6	11,096	30.4	+ 6.3
Belgium	30,839	82.3	33,324	91.3	+10.9
Denmark	18,067	49.5	19,235	52.7	+ 6.5
Finland	7,483	20.5	8,067	22.1	+ 7.8
France	130,998	358.9	140,087	383.8	+ 7.0
Germany (Western)	73,109	200.3	82,563	226.2	+12.9
Greece	11,279	30.9	11,534	31.6	+ 2.3
Ireland	7,556	20.7	8,140	22.3	+ 7.8
Italy	77,927	213.5	84,643	231.9	+ 8.6
Netherlands	41,610	114.0	46,318	126.9	+11.5
Norway	16,388	44.9	17,338	47.5	+ 5.8
Portugal	9,016	24.7	9,271	25.4	+ 2.8
Spain	17,556	48.1	19,539	53.5	+11.2
Sweden	45,772	125.4	49,713	136.2	+ 8.6
Switzerland	12,593	34.5	14,089	38.6	+11.9
United Kingdom	200,239	548.6	211,736	580.1	+ 5.8
Yugoslavia	4,307	11.8	4,599	12.6	+ 6.8
USSR & Satellites	456,260	1,250.0	492,750	1,350.0	+ 8.4
Others	94,097	257.8	91,615	251.0	— 2.6
Europe	1,264,735	3,465.0	1,355,646	3,714.1	+ 7.2
Algeria & Tunisia	14,016	38.4	15,403	42.2	+10.0
British East Africa	6,826	18.7	7,373	20.2	+ 8.0
Canary Islands	14,782	40.5	15,695	43.0	+ 6.2
Egypt	34,273	93.9	36,514	97.3	+ 3.6
Ethiopia & Fr. Somaliland	4,198	11.5	4,271	11.7	+ 1.7
French Morocco	7,008	19.2	7,556	20.7	+ 7.8
South Africa	26,207	71.8	27,922	76.5	+ 6.6
French West Africa	12,045	33.0	12,728	34.9	+ 5.7
Portuguese West Africa	5,548	15.2	5,950	16.3	+ 7.3
British West Africa	4,453	12.2	4,928	13.5	+10.7
Others	12,994	35.6	13,030	35.7	—
Africa	142,350	390.0	150,380	412.0	+ 5.6
Aden	22,447	61.5	24,710	67.7	+10.1
Bahrain	4,563	12.5	4,928	13.5	+ 8.0
Iran	10,658	29.2	21,170	58.0	+98.5
Iraq	8,760	24.0	9,417	25.8	+ 7.5
Israel	8,760	24.0	9,673	26.5	+10.4
Saudi Arabia	15,221	41.7	15,658	42.9	+ 2.9
Syria & Lebanon	8,103	22.2	9,125	25.0	+12.6
Turkey	9,344	25.6	9,965	27.3	+ 6.7
Others	20,184	55.3	20,257	55.5	—
Middle East	108,040	296.0	124,903	342.2	+15.6
Australia	48,800	133.7	55,662	152.5	+14.0
Ceylon	6,096	16.7	6,570	18.0	+ 7.8
Hong Kong	5,366	14.7	5,548	15.2	+ 3.4
India	33,470	91.7	36,463	99.9	+ 8.9
Indonesia	25,587	70.1	27,849	76.3	+ 8.8
Japan	65,445	179.3	74,825	205.0	+11.5
Malaya	20,148	55.2	20,987	57.5	+ 4.2
New Zealand	10,804	29.6	11,571	31.7	+ 7.1
Pakistan	10,658	29.2	11,315	31.0	+ 6.2
Philippines	13,213	36.2	14,564	39.9	+10.2
S. Vietnam	4,928	13.5	3,979	10.9	+23.8
Thailand	4,818	13.2	5,512	15.1	+14.4
Others	64,932	177.9	67,890	186.0	+ 4.6
Far East & Oceania	314,265	861.0	342,723	939.0	+ 9.0
EASTERN HEMISPHERE	1,829,390	5,012.0	1,973,664	5,407.3	+ 7.9
WORLD TOTAL	5,270,339	14,439.4	5,644,030	15,463.1	+ 7.1

WORLD CRUDE OIL PRODUCTION

(Thousands of Barrels Daily)

	1955 Second Quarter	1955 First Quarter	1954 Year
United States	6,721.6	6,824.0	6,346.0
Canada	311.1	315.3	262.7
Mexico	235.0	235.0	226.8
Total N. America	7,267.7	7,374.3	6,835.5
Venezuela	2,085.8	2,135.2	1,897.2
Colombia	107.1	105.3	109.5
Argentina	80.0	81.5	81.3
Trinidad	67.0	66.0	65.0
Peru	47.0	47.0	46.7
Ecuador	9.0	8.5	8.4
Chile	6.3	6.0	4.8
Brazil	5.7	5.2	2.6
Bolivia	7.0	6.7	4.5
Cuba	0.6	0.5	0.2
Total S. America	2,415.5	2,461.9	2,220.2
WESTERN HEMISPHERE	9,683.2	9,836.2	9,055.7
Austria	60.0	60.0	62.0
Germany	60.5	55.6	51.8
Netherlands	19.1	18.9	17.8
France	12.0	12.0	9.8
Yugoslavia	3.0	3.0	4.2
French Morocco	2.5	2.5	2.4
Italy	2.8	2.8	1.5
Algeria	1.5	1.5	1.6
United Kingdom	1.2	1.2	1.2
Total Europe & Africa (excluding USSR)	162.6	157.5	152.3
USSR	1,270.0	1,215.0	1,145.0
Romania	150.0	150.0	150.0
Hungary	14.0	14.0	14.0
Poland	4.0	4.0	4.0
Albania	6.0	6.0	3.0
Czechoslovakia	2.5	2.5	2.5
Total USSR & Sat.	1,446.5	1,391.5	1,318.5
Total Europe & Africa	1,609.1	1,549.0	1,470.8
Kuwait	1,156.0	1,062.4	955.8
Saudi Arabia	936.0	951.6	952.6
Iraq	657.0	640.0	628.7
Qatar	113.0	108.5	104.9
Iran	323.4	259.0	56.0
Egypt	33.0	33.0	37.7
Bahrain	30.5	30.1	30.1
Neutral Zone	24.0	24.0	16.5
Turkey	1.8	1.8	1.1
Total Near & Middle East	3,274.7	3,110.4	2,783.4
Indonesia	240.0	242.2	218.1
B. Borneo	99.0	99.0	98.8
New Guinea	10.0	11.7	10.8
India	6.5	6.1	6.8
Japan	6.0	5.9	5.9
Pakistan	6.0	6.0	5.0
Burma	4.0	4.5	3.4
China	2.5	2.5	2.0
Total Far East & Oceania	374.0	377.9	350.8
TOTAL E. HEMISPHERE	5,257.8	5,037.3	4,605.0
WORLD TOTAL	14,941.0	14,873.5	13,660.7

ian demand is running nearly 15 percent higher than last year and the increase in Argentina is about six percent. Growth in movement of heavy crude to the United Kingdom is forecast as a result of the 18 percent rise in coal prices which have greatly improved the competitive position of oil in the generation of electricity and in other heavy industry.

U.S. crude production in the first half was about six percent higher than a year ago—not quite as great a gain as was experienced in demand. Imports of Canadian crude in the Pacific Northwest and of heavy oils on the Atlantic seaboard were largely responsible.

Canadian crude production was up a third in the first half year to 314,000 b/d and now is well over half of the oil requirements of the dominion. The increase of 33 percent in production compares with a rise of nearly nine percent in domestic demand. On balance, Canada has just about disappeared as a buyer of United States oil since its exports in the Midwest and Northwest are nearing the level of exports of crude to Ontario and special refined products.

The recovery of Europe from its wartime depression is continuing again this year at a remarkable rate. A phenomenon is the growth of motor car registrations by private motorists as a supplement to industrial consumption. In 1954 domestic demand for petroleum appears to have increased about 13 percent in Western Europe to 2,215,000 b/d. The increase of over 255,000 b/d was largely met by Middle East supplies, although domestic production of crude and other liquids was up about 50,000 b/d and Soviet Russia and its satellites exported around 75,000 b/d of which a good part went to Western Europe.

The rate of rise in European domestic demand appears to be flattening out somewhat this year, but is still nearly seven percent. A rise of around 150,000 b/d for the year is anticipated, bringing the average for Western Europe to about 2,365,000 b/d. Net imports from the Middle East in 1955 will not be far from two million barrels daily.

Effect of the broadening European market is seen in the rate of production from Middle East fields in the first half year. In 1954 the area produced an average of 2,783,400 b/d and in the first six months of this year this has risen 409,500 b/d to 3,192,900 b/d.

An important factor in the rise has been of course, the return of Iran as a large producer. In the first half of 1955 the consortium withdrew 291,200 b/d from Iranian fields, compared with a production of 39,700 b/d in the first six months of 1954 by the Iranian government operating company. Reentry of Iranian crude has held the increases from other parts of the Persian Gulf region to 163,000 b/d, virtually all of which has come from Kuwait.

Resumption of oil operations is having a profound effect on domestic oil consumption in Iran itself. This is partly due to requirements for bunkering of tankers lifting refined products from the Abadan refinery and crude for overseas shipments. Resumption of operations also is stimulating the domestic economy. At mid-year it was estimated that Iranian consumption this year will be almost double 1954, averaging 58,000 b/d compared with 29,200 b/d. In general, consumption in the Middle East this year is expected to average 342,200 b/d, an increase of 15.6 percent over the 296,000 b/d demand in 1954.

Kuwait crude production jumped past a million barrels daily in the first quarter and averaged 1,156,000 b/d in the second quarter. The six-month record was 22.4 percent, about the same period last year.

Iraq output was up 42,500 b/d or seven percent to 648,800 b/d and Qatar production rose 14 percent to 110,500 b/d. Kuwait Neutral Zone production was more than double last year, but still is not significant when compared with other Persian Gulf areas.

Only major oil nation to produce less oil was Saudi Arabia, which averaged 944,300 b/d in the January-June period compared with 965,000 b/d a year ago, a drop of 21,000 b/d or two percent. Egyptian production was 5,000 b/d lower as old fields continue their steady decline.

In Oceania and the Far East there were no significant changes in production except in Indonesia, where commercial operation of the Minas field in central Sumatra has created some increase. Consumption in this general area, however, still is rising rapidly and far outstrips production.

Domestic demand in southeast Asia and Oceania rose 10 percent in 1954 to 861,000 b/d and appears certain to show another gain this year of nine percent to 939,000 b/d. Ignoring the Russian production on Sakhalin Island, which is consumed in Siberia and by the Chinese, there is an oil deficit in this general area of 563,000 b/d. Production is only 40 percent of demand.

Australia and Japan, with increases of 14 and 11.5 percent respectively, are contributing strongly to the market for Middle East crude. Australia is expected to consume 152,500 b/d of oil with no indigenous production and Japan 205,000 b/d with a local crude supply of only 6,000 b/d. Indian demand this year is running 8.9 percent over last year and probably will average 99,900 b/d.

In the 11 years which have elapsed since the close of World War II, production of crude oil and natural gas liquids has doubled. Except for the brief period following the Iranian shutdown, the industry has been able to supply all of the oil required for world recovery without difficulty. Today, producing capacity at efficient rates is well above demand, with the result that world trade in oil can be conducted in an orderly manner, although some restraint is necessary to avoid undue inventory accumulation and political difficulties in the United States where independent producers resent the growth of imports in a period of adequate domestic supply.

COMPARISON OF U.S. IMPORTS 1954 VS 1955[1]

(Thousands of Barrels)

	Imports			Domestic Crude Production			Ratio Imports To Production		Excess Over 1954 Ratio	
	1955	1954	% Change	1955	1954	% Change	1955	1954	Volume	%
CRUDE OIL										
January	739	618	19.6	6,761	6,240	8.3	10.9	9.9	70	1.0
February	751	621	20.9	6,835	6,379	7.1	11.0	9.7	88	1.3
March	742	654	13.5	6,886	6,507	5.8	10.8	10.1	47	0.7
First Quarter	744	631	17.9	6,827	6,375	7.1	10.9	9.9	68	1.0
April	697	574	21.4	6,887	6,615	4.1	10.1	8.7	98	1.4
May	746	708	5.4	6,664	6,471	3.0	11.2	10.9	20	0.3
June	728	624	16.7	6,616	6,500	1.8	11.0	9.6	93	1.4
Second Quarter	724	636	13.8	6,722	6,528	3.0	10.8	9.7	72	1.1
Six Months	734	634	15.8	6,775	6,452	5.0	10.8	9.8	70	1.0
RESIDUALS										
January	573	446	28.5	6,761	6,240	8.3	8.5	7.1	93	1.4
February	581	472	23.1	6,835	6,379	7.1	8.5	7.4	75	1.1
March	517	388	33.2	6,886	6,507	5.8	7.5	6.0	104	1.5
First Quarter	556	434	28.1	6,827	6,375	7.1	8.1	6.8	92	1.3
April	391	325	20.3	6,887	6,615	4.1	5.7	4.9	53	0.8
May	373	263	41.8	6,664	6,471	3.0	5.6	4.1	100	1.5
June	325	307	5.9	6,616	6,500	1.8	4.9	4.7	14	0.2
Second Quarter	363	298	21.8	6,722	6,528	3.0	5.4	4.6	54	0.8
Six Months	460	366	25.7	6,775	6,452	5.0	6.8	5.7	74	1.1

[1] Authority: U.S. Bureau of Mines and American Petroleum Institute.

NO ACTION

foreseen on U.S. oil import problem

By Joseph B. Huttlinger

THE CONTROVERSY over U.S. oil imports grew hotter in Washington during August when the final figures for the first half of the year showed imports were up considerably over the same period in 1954. A group of 27 senators signed a joint letter to Director Arthur S. Flemming of the Office of Defense Mobilization asking what action he was going to take. Dr. Flemming thereafter announced he was requesting information from the importing companies covering a month-by-month comparison of imports in 1955 through July 31 with the corresponding months in 1954 and a statement of the companies' future policy regarding imports through the first half of 1956.

Despite all this sound and fury, sources in Washington estimated that the chances were about ten to one against any action by the government to limit imports. The important aspect is not the absolute level of imports themselves, which were up 15.8 percent for crude and 25.7 percent for residuals, but their ratio to domestic production. In early 1955 the Cabinet Committee report stated: " . . . if in the future, imports of crude oils and residual fuel oils exceed significantly the respective proportions that such imported oils bore to domestic production of crude oil in 1954, appropriate action should be taken." Those 1954 ratios were 10.34 percent for crude and 5.6 percent for residuals during the year and 9.8 and 5.7 percent respectively during the first six months. Import ratios of crude and residuals for the first half of 1955, as shown by the accompanying table, were only 0.5 and 1.2 percent higher respectively if compared with all of 1954 and only 1.0 and 1.1 percent higher compared with the corresponding first half of 1954. A check of responsible government officials indicated that this is not considered a significant increase which would bring a recommendation to the President for action.

There are additional factors as well which make the possibility of governmental action more remote. One is that the crucial ratio will probably drop during the last months of 1955, based on oil company estimates of imports during the coming three months and Bureau of Mines estimates of U.S. crude oil production. Second, there appears to be a real legal question as to whether the 1954 amendment to the Reciprocal Trade Agreements Act actually empowers the President to move against oil imports. His powers are based on the 1954 amendment to the Reciprocal Trade Agreements Act which states that on advice (from Dr. Flemming) that imports are imperiling national security, he may order an investigation and if this is actually the case may "take such action as he deems necessary." While the arguments for the law used the words "quota" and "tariff" frequently, the law itself is so vague and unspecific that specific action would be subject to challenge in the courts.

1. *Comodoro Rivadavia and Caleta Olivia.*
2. *Plaza Huincul—Challaco—Cerro Bandera —17 de Octubre and San Martin.*
3. *Vespucio — Tranquitas—San Pedro—Rio Pescado—Campo Duran — Madrejones — Guandacarenda.*
4. *Cacheuta — Tupungato — Barrancas — Lulunta.*
5. *El Sosneado.*
6. *Ranquilco — Pampa Palauco.*
7. *Palermo Aike.*
8. *Rio Grande.*
9. *Chilean oil fields.*

A. Area to be explored by California Argentina.

Dr. Orlando Santos, Minister of Industries, who signed the California agreement in the name of the Argentine government.

Standard of California ARGENTINA CONTRACT nears deadline

CONTROVERSY still rages in Argentina about the admission of foreign capital to aid in development of Argentine oil. Three offers have been made to the Argentine government. The one under current debate is the contract proposal by Standard Oil Company of California. The future of this contract still remains in doubt, but consensus in Buenos Aires now is that the Standard of California contract will be approved by Congress. If this contract is not approved by September 30, 1955 it becomes invalid.

An offer was made August 2 by Standard Oil Co. (N.J.). This proposal is still in the negotiating stage; however, it reportedly involves some 11,000 square miles in the Neuquen area. Its terms involve a substantial investment by the company and cover exploration, production, refining, distribution and exports. A third proposal, by the Atlas Corp. headed by Floyd Odlum, also concerns possible development of the Neuquen fields; however, this proposal is now being completely revised.

In a recent statement Dr. Gomez Morales, Secretary for Economic Affairs, defended the California-Argentina contract. Although he declared that the northern sections of Argentina represented the best potential producing area of the country and would be reserved to government operations, he also declared that Y.P.F., the government's petroleum monopoly, needed foreign assistance in other areas. After 48 years of effort, Dr. Morales said, national production is less than 50 percent of consumption (in 1954, 42.3 percent), despite higher allocations to Y.P.F. than ever before in its history.

President Peron also came to the Socal contract's defense, and stated privately during early August that he would make every effort to push the contract through. At last report the principal differences appeared to center on arbitration and surrender provisions. The Standard of New Jersey contract was said to have been better received because of its simpler construction.

California Argentina, a subsidiary of Standard Oil Co. of California, signed the contract April 29, 1955 covering all phases of petroleum operations from exploration to refining and marketing. As the accompanying map shows, the area is located in the extreme south of Argentina, comprising about 19,100 square miles. Provision is contained for reduction of the area to 11,600 square miles at the end of four years and to 1,980 square miles at the end of 20 years. Related areas may be explored if not held by other parties. The contract has a duration of 40 years, extendible for five more years on company option if commercial production has been obtained. All Y.P.F. information on the area will be sold to the company. In the event a new oil law is passed during the contract term, the company may adopt any provisions thereof it considers more advantageous.

The company is obligated to begin operation within six months of date of approval of the contract. It enjoys certain rights, including exemption from all taxation except that specified in the contract and the right to import all equipment and supplies free of license or duty, with right of free re-export. Preference in employment is to be given to Argentine citizens, but the company is given the right to employ any nationality.

The initial exploration expenditures by the company are set at a total of $13.5 million U.S. during the first five years. This is distributed $4 million during the first two years, $5 million during the third and $4.5 million in the fourth year. A drilling obligation is contained, specifying one wildcat well by the end of the fourth year to such depth as judged by the company to be conclusive. Another must be started within three months and if six years go by without discovery, the company must employ two rigs. At the end of eight years without production, three rigs are to be kept active. If oil is found within five and one-half years, the company must continue wildcatting with two rigs and after eight years not less than one rig for each 1,980 square miles. The company may request relief from any of these obligations in any part of the area under contract.

At the end of 20 years not less than 100 wells should be completed and at the end of 35 years not less than 250.

When oil has been discovered, the company must determine the extension of the pool and develop it promptly and efficiently, but it may limit its drilling to the equivalent of one well for every square kilometer (0.4 square mile); furthermore, it shall not be compelled to develop its production above the available storage and transportation capacity.

If natural gas or condensate are discovered, the company is not under obligation to drill a larger number of wells than the equivalent of one for each four square kilometers, nor to continue the drilling of additional wells if Y.P.F. cannot receive the potential production of the field.

The company is given the right to build oil pipe lines to marine terminals. All oil is to be handed over to Y.P.F. and only amounts produced in excess of Y.P.F.'s requirements and those of the country may be exported. The price to Y.P.F. is to be five percent under export prices.

The company may organize a new corporation to carry on refining when production rises above 6,290 barrels per day, reducing Y.P.F. supplies by the amount refined. Refined products may be marketed either directly or to other marketing companies.

Exports may be sold to any purchaser and shipped by any tanker. The export price is based on East Texas crude and fob. price of Oficina crude from Puerto La Cruz, Venezuela. In the former case the East Texas price is the main average of 39° gravity crude posted by Humble, Shell, Gulf and Texas companies, corrected for density variation and yields of gasoline and middle distillates. If the Oficina price is used, the average fob. price posted by Shell and Creole is used. Natural gasoline and natural gas have prices based on the crude price.

The company is exempted from all tax payments except those on revenues and extraordinary profits and sales taxes paid by the consumer. The total of taxes is limited to 50 percent of net income. If taxes are less than half of net profit, the difference must be paid to the government.

Imports of dollars for operations are at the most favorable legal free rate, currently about 14 pesos per dollar. Any profits

TABLE I

OIL FIELDS DISCOVERED IN THE ARGENTINE

Year of Discovery	Name of field	Location	Company who opened field	Year of Discovery	Name of field	Location	Company who opened field
1907	Comodoro Rivadavia	Zone A	Y.P.F.	1935	Plaza Huincul	Zone 4	Y.P.F.
1916	Comodoro Rivadavia	Zone C	ASTRA	1935	Salta	Río Pescado	Y.P.F.
1916	Comodoro Rivadavia	Zone A	Ferrocarrilero	1935	Mendoza	Tupungato	Y.P.F.
1918	Plaza Huincul	Zone 1	Y.P.F.	1937	Comodoro Rivadavia	Zone F	Y.P.F.
1919	Comodoro Rivadavia	Zone D	Y.P.F.	1937	Salta	Ramos	Standard Oil Co. of N.J.
1923	Plaza Huincul	Zone 2	Standard Oil Co. of N.J.	1939	Mendoza	Luluntas-Barrancas	Y.P.F.
1925	Comodoro Rivadavia	Zone B	Diadema Argentina and Astra	1941	Plaza Huincul	Zone 5	Y.P.F.
				1943	Plaza Huincul	Zone 6	Y.P.F.
1925	Comodoro Rivadavia	Zone C	Diadema Argentina	1946	Comodoro Rivadavia	Caleta Olivia	Y.P.F.
1926	Plaza Huincul	Zone 3	Standard Oil Co. of N.J.	1949	Plaza Huincul	Zone 7	Y.P.F.
				1951	Plaza Huincul	Zone 8	Y.P.F.
1926	Salta	Agua Blanca	Standard Oil Co. of N.J.	1951	Mendoza	Pampa Palauco	Y.P.F.
				1951	Salta	Campo Durán	Y.P.F.
1926	Mendoza	Sosneado	Cia. Sosneado	1951	Comodoro Rivadavia	Cta. Olivia Zone 0-46	Y.P.F.
1927	Salta	Tartagal	Standard Oil Co. of N.J.	1952	Comodoro Rivadavia	Pampa del Castillo Z. T.19	Y.P.F.
1928	Salta	Tartagal	Y.P.F.	1953	Neuquén	Cerro Bandera and Barda González	Y.P.F.
1929	Salta	San Pedrito	Standard Oil Co. of N.J.	1953	Neuquén	Del Medio	Y.P.F.
1932	Mendoza	Cacheuta	Y.P.F.	1953	Salta	Madrejones	Y.P.F.
1932	Comodoro Rivadavia	Zone E	Y.P.F.				

or other dollar amounts may be freely transferred under government guarantee back to the United States, Argentine pesos received being converted to dollars at the contract rate of exchange.

Special conditions surround the possible transfer, interpretation, arbitration or termination of the contract. Government permission is necessary for any transfer. Differences concerning questions of fact or engineering are to be settled by arbitration. The identity of the arbiters now forms one of the points of controversy. Points of law are to be settled by Argentine courts.

The company is given the right of voluntary surrender on all or parts of the area in units of more than 2,417 acres. If it exercises that right, or if the contract terminates for any reason before production is found, the company may withdraw all equipment and supplies. If production is found, but the contract expires before the end of 40 years, all equipment and supplies must be offered for sale to Y.P.F. The right of transfer of dollars received applies. If the contract runs its term and expires, all such equipment which has been included under operating expenses account becomes the property of Y.P.F. free of charge, except vehicles and personal belongings.

The government may terminate the contract if payments or other obligations of the company are not correctly met. If this termination is by other than the Department of Justice and not the company's fault, it may receive in compensation all its non-recovered expenditure to date, plus a sum equal to 100 percent of the net income figured in accordance with the contract which would have accrued on production of proved reserves over a 45-year period. In addition, the company is to receive 25 percent of the field value of any crude produced and stored during the 45 years or extensions thereof which the company had located and identified as possible oil pools before termination of the contract. The company is subject to the specified 50 percent net income taxation on all these receipts.

— HISTORY —

Attitude of administration leaders in seeking outside capital to minimize loss of exchange on oil imports has been sparked by President Peron. In his presidential message delivered before Congress on May 1, 1955, General Peron emphasized that the development of national oil resources offers the most economical and immediate means of reaching self-sufficiency in power requirements. To this effect, he said that he was in favor of the cooperation of foreign capital for increasing local oil production.

On May 9, 1955, the Executive Power sent to Congress for its approval the Standard of California agreement signed by the Minister of Industries. This contract had already been approved by the Executive Power on May 6 and published by the House of Representatives on May 11. It must be enacted as a national law before it becomes effective. This step marks one of the most important events in the Argentine petroleum industry since the discovery of oil in Comodora Rivadavia, and in the contemporary political history of the country.

Just a few months before the signature of the agreement was announced by the government, Dr. Frondizi, formerly representative and leader of the opposition in Parliament, published a voluminous book entitled *Oil and Politics*, strongly favoring the state oil monopoly and aiming directly against any agreement with foreign oil companies.

In order to have a better understanding of the far reaching consequences of this agreement on the Argentine oil industry, we shall endeavor to present a quick review of the struggle between those favoring free enterprise and state monopoly of oil, since its discovery in Argentina.

Initial period up to 1922: The announcement of the discovery of oil in Comodoro Rivadavia on December 13, 1907, was followed by a presidential decree reserving for the state some 247,000 acres (100,000 hectares) of land surrounding the town of Comodoro Rivadavia; but, in 1910, National Law 7059 was passed reducing the lands reserved for the state to 14,000 acres. This land was to be reserved for a period of not longer than five years for exploration.

TABLE II

CONSUMPTION OF LIQUID FUELS IN THE ARGENTINE REPUBLIC IN THOUSANDS OF BARRELS

Year	Aviation Gasoline	Motor Gasoline	Kerosines	Gas-Oil	Diesel-Oil	Fuel-Oil	Lubricants	Total
1930	15	6,100	1,110	480	85	12,500	(1)	20,290
1935	10	6,050	1,110	1,380	3,200	10,600	(1)	22,350
1940	75	8,400	1,680	1,760	3,400	15,250	412	30,977
1945	110	6,520	2,360	374	1,570	12,450	550	23,934
1950	400	13,100	4,590	2,010	3,840	33,300	895	58,135
1954	486	13,700	6,690	4,850	5,280	38,100	1,020	70,126

(1) No information.

This law authorized the subdivision of the Comodoro Rivadavia area into 1,500-acre parcels and offered them on public tender for private exploration and production. In the same year the government created the National Bureau for the exploitation of the Comodoro Rivadavia oil fields.

Three years after this law was issued, the President, based on the fact that a large number of concessionaires did not comply with the requirements of the mining code, signed a decree revoking all oil concessions on lands not explored in accordance with the code, and reserved for the State the exploration of an extension covering 400,000 acres until Congress enacted a special oil law.

The oil companies began their wildcatting operations shortly after 1910, and in 1916 the first private production was obtained in Comodoro Rivadavia. By this time the Government oil fields were producing 2,300 b/d.

Standard Oil Co. (N.J.) began production in the Plaza Huincul field in 1925, and in 1925 initial production of Diadema Argentina (of the Royal Dutch/Shell Group) was obtained in Comodoro Rivadavia.

Table I gives the dates of discovery of the different producing fields in the Argentine.

In 1922, the Bureau of Government Oil Fields was changed into a National Department with an independent board of directors and Colonel Mosconi was appointed as first director general of the new Direccion National de Yacimientos Petroliferos Fiscales (to be known in the future as Y.P.F.).

Colonel Mosconi favored the state monopoly of the oil industry. He built Y.P.F. into a powerful organization, and during his eight years of office, Y.P.F. entered all phases of the industry and developed what was to be one of the largest oil companies in Argentina with oil fields, overseas tankers, refineries, storage and distribution plants and service stations.

At the end of 1925, Y.P.F. started running the 15,000-barrel La Plata refinery (now the Eva Peron refinery with a capacity of 80,000 barrels). A few years later, it became possible to reduce the price of gasoline.

Y.P.F. increased its oil production from 6,000 b/d in 1925 to 12,800 b/d in 1926 and exploited oil fields in Comodoro Rivadavia, Plaza Huincal and Salta and was exploring in Mendoza and Jujuy.

During this period, no concessions were granted to private companies, land reserves for the state were enlarged and the Executive Power placed before Congress a number of oil law projects which were not approved.

In 1930, Mosconi, (then General), was separated from the directorship of Y.P.F. and this organization entered a period of routine work, while the private oil companies continued expanding. In 1930, oil production in Argentina reached nine million barrels, of which 5,200,000 barrels, or 58 percent, was produced by Y.P.F. Imports of crude oil and petroleum products, (including residual fuel oil) amounted to 5,800,000 barrels, or 66 percent of the total oil production of the country. During this period, both private companies and Y.P.F. tried to win the eastern gasoline markets, (where more than 70 percent of gasoline is being consumed).

In 1932, General Justo was elected President of the Argentine Republic and he appointed Mr. Silveyra as president of the board of directors of Y.P.F. During the 11 years he was in charge, Y.P.F. renewed its expansion and became the largest oil company in the Argentine.

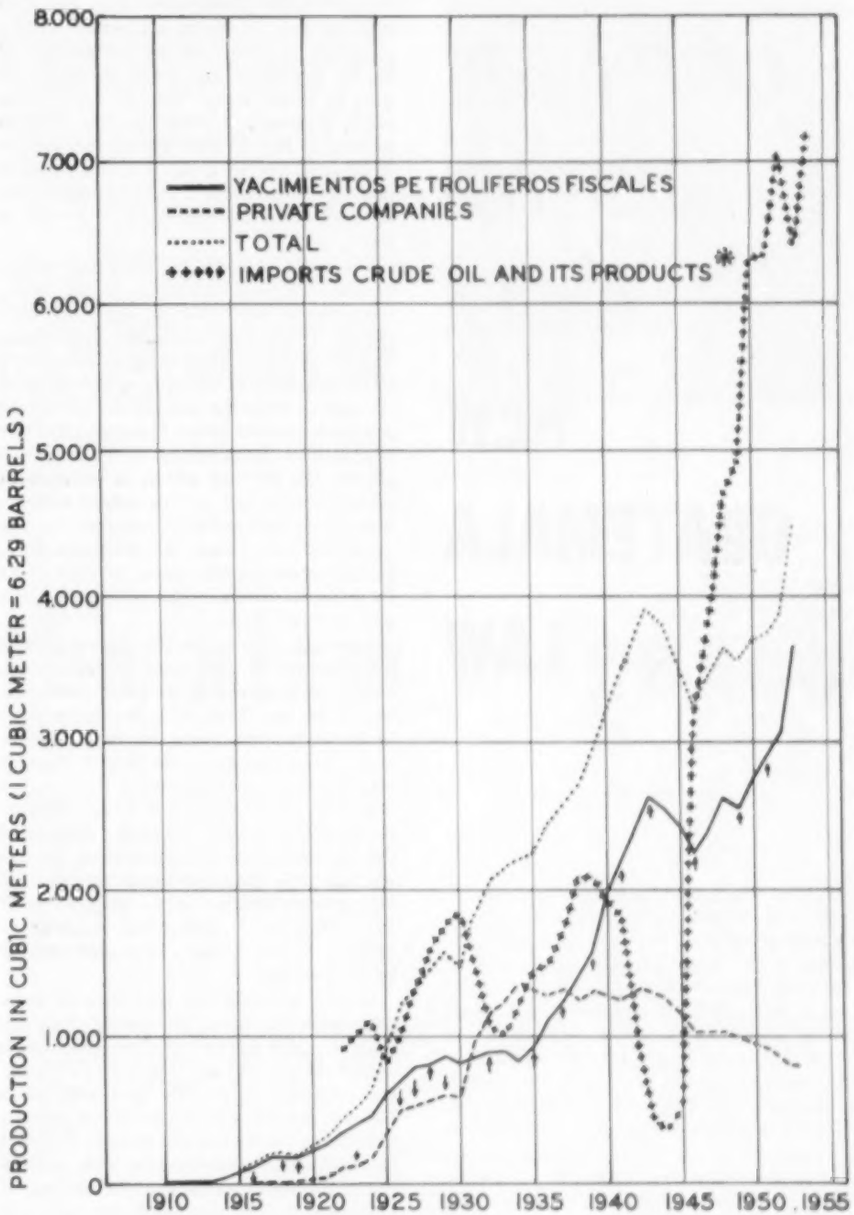
In 1932, Y.P.F. expanded its cracking facilities and began producing lubricants and asphalts at the La Plata (now Eva Peron) refinery.

In 1932 a uniform gasoline price was established all over the country.

In 1934, General Justo signed a presidential decree increasing the areas reserved for Y.P.F., and in 1935 he succeeded in having Congress approve National Law 12,161. This law declared all oil resources

(*Continued on page 110*)

CRUDE OIL PRODUCTION IN ARGENTINA
SINCE OIL DISCOVERY IN COMODORO RIVADAVIA



** Includes aviation gasoline, gasoline, kerosines, gas-oils, lubricating oil and residual fuel-oil. Arrows mark the year when new fields were placed in production either by YPF or private companies.*

FOREIGN COMPANIES ADMITTED UNDER NEW GUATEMALA LAW

DECREE 345, the new petroleum law of Guatemala, has been passed and came into effect August 8. In its final form it resembles the Venezuelan and Peruvian laws in that it covers all phases of the petroleum industry except marketing and its tax provisions are based on the 50-50 split of profits before foreign taxes. Even more, however, it resembles the Turkish petroleum law of 1954. Its regulations are to be published by October 9, and although no delay is expected, it will be recalled that in Turkey the regulations took a year to pass.

The new law makes the customary reservation of subsoil ownership to the State, but places no restriction on foreign participation in operating companies. An obligatory 30 percent stock offering must be made to Guatemalans at the time of formation of companies, however, and certain provisions are made in their favor. Generally, the law is a distinct improvement over the former Decree 649 of 1949 which, in addition to such faults as lack of guaranteed conversion from exploration concessions to exploitation concessions, or arbitrary fines, raised serious doubts among oil men about its power to admit foreign companies even on a contract basis.

Before passage of the 1949 decree several companies were interested in Guatemala. Following a survey of laws and conditions in 1945 by Max Thornburg, then an adviser to the State Department, the first exploration license was given to Messrs. Stopper and Osborne, later operated in 1947 by the Standard Oil Company of Ohio. Atlantic Refining Co. and the Tidewater Associated Oil Co. participated in exploration following July 1947. Shell also has conducted considerable exploration in the area. None of these companies carried out exploratory drilling, for work was interrupted in 1949 by Decree 649.

It may be significant that none of these companies exploring previously has reentered under the new law. No concessions have been granted in Guatemala yet; however, preliminary permits have been taken out by several companies. They include The Texas Co. and others who participated in the discussions on the law, such as Conorada Petroleum Corp. (joint subsidiary of Ohio Oil Co., Continental Oil Co. and Amerada Petroleum Corp.), Union Oil Company of California, Richmond Oil Co. (now California Exploration Co., owned by Standard Oil of California), and independent interests, including Clint Murchison of Texas and Dillon-Reed & Co. of New York.

The geological conditions of Guatemala, having been untested by drilling, remain in doubt. The Tertiary and Cretaceous beds which produce in Mexico are present, but the Tertiary outcrop is not so thick and the lithology of the Cretaceous differs considerably from Mexican experience.

Although the law provides for concessions over refining and transportation, the only important aspects are exploration and exploitation provisions. Exploration is divided into two phases. The first of these is reconnaissance, which covers all exploratory operations except drilling. Reconnaissance rights are granted in a separate permit on which there are no petroleum taxes levied. Although general taxes of Guatemala are payable, there are none which would affect these initial operations and operators are exempt from import duties. Neither are there any limits to the area covered or the length of time operations may be carried on. On the other hand, the permit is not exclusive and persons holding the reconnaissance permit gain no right to a later exploration permit or other exclusive right.

The most geologically favorable area over which reconnaissance operations would be carried out is the Peten. It is a 13,843-square-mile region of flat, densely forested lowlands and coastal plain. The average elevation is 500 feet, rising in occasional groups of hills to a maximum of 1,600 feet, although the average is around 700. The climate is tropical. Temperatures average around 80° F. Operating crews should be on the ground and ready to operate at the beginning of the dry season which runs November through April. Otherwise they would contend with about 150 inches of rainfall in the May-October period.

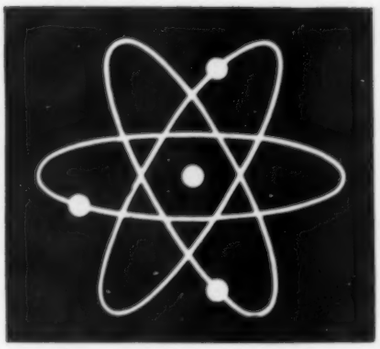
Transportation in the Peten would have to be mainly by air or mule pack. There is only one road, which runs through the rain forest from Flores in Central Peten to Coban on the south. There are also some truck roads along the eastern border. The only railway is narrow gauge, running from the west coast of Guatemala through Guatemala City to Puerto Barrios on the Caribbean coast below the Peten. There are no ports into Peten itself, since British Honduras which, incidentally, Guatemala claims, lies between it and the Caribbean. The nearest port is Livingston at the mouth of Lago de Izabal, actually a navigable fiord and extending inland for about 40 miles below Peten. Other rivers and streams of the Peten are not navigable.

The maximum exploration concession area which may be held by one person or company is 988,400 acres (400,000 hectares) and the creation of subsidiaries to hold more is not permitted. The area may be divided into any number of concessions from one to ten, having an initial term of six years. This term is extendible for four more years by two extensions of two years each. There is no drilling obligation, but the extensions are conditioned on drilling being performed previously. The government requires certain reports on information discovered, but will hold same confidential for three years after the concession term has run out.

What may be an important aspect, in view of the interest in this area, is the regulation concerning priority of applications. Applications are considered in the order received and if two or more applications are filed on the same area in the same day,

(*Continued on page 120*)

Eger V. Murphree, president of Esso Research and Engineering Co., has been intimately connected with atomic research and development since its inception. During World War II, he served as a member of the Office of Scientific Research and Development S-1 Executive Committee, headed by Dr. J. B. Conant. The committee was instrumental in the establishment of the Manhattan Project which developed the atomic bomb. Prior to organization of that committee, Mr. Murphree was chairman of the planning board which was responsible for the technical and engineering aspects of the work, for procurement of materials, and for construction of pilot plants and full-size production plants. In addition, Mr. Murphree was in charge of the design of a heavy water plant in British Columbia and supervised much of the work on the centrifugal method of separating uranium isotopes.



the atom in peace

By Eger V. Murphree*

- ***Uranium can multiply the world's energy resources 23 times.***
- ***Electricity from atomic energy is more costly than from other fuels at present.***
- ***By 1975 perhaps 1.5 percent of U. S. energy requirements may be supplied by the atom.***
- ***Atomic power for transportation will have limited application except in the marine field.***
- ***Atomic radiation as a promoter of chemical reactions is a promising field for research.***
- ***In the fields of medicine and industrial and agricultural research, the atom has made great progress.***

THE OPERATION of an atomic pile in Chicago on December 2, 1942 to give the first demonstration of a self-sustaining nuclear chain reaction opened up a new source of energy. From the fissioning of one pound of a particular form of uranium in an atomic reactor, energy roughly equivalent to that of 1,300 tons of coal or of 6,000 barrels of fuel oil can be obtained. Before this demonstration of the feasibility of producing energy through atomic fission, the main sources of concentrated energy available to man were the fossil fuels such as coal, oil and natural gas, with the somewhat more distant possibility of more effectively utilizing the energy of the sun. With this new source of energy from the atom, the potential energy supplies of the world have been greatly extended.

As our civilization advances, our energy needs increase. By 1975, for example, total consumption of energy in the United States is expected to increase by over 60 percent. The increase in use of electric energy is expected to expand at an even more spectacular rate. By 1975 the consumption of electric energy will probably be about three-fold greater than it is today. This in-

*President, Esso Research and Engineering Co. This article was first presented by Dr. Murphree as a lecture at Hamburg on June 23 and before the Royal Dutch Institute of Engineers, The Hague.

crease in demand for electric energy is in part due to the many electrical devices being used in the home for easing the tasks of the housewife. The greatly expanded use of air-conditioning to give more comfort in the home, offices and factories will markedly contribute to the increased demand for electric energy. Outside the United States, an even greater rate of increase in energy requirements can be expected.

In the past man has relied mainly on coal, oil and natural gas to meet his energy needs and the availability of these materials has expanded with man's requirements. These fossil fuels can supply man's needs for a long time in the future. They are not, however, uniformly distributed and considerable transportation is involved in making these fuels available where they are needed. In addition, availability of the fossil fuels in certain countries has been limited due to currency problems. As we go into the future, the cost of fossil fuels will in general increase because the natural trend is to use up first those deposits which can be produced at lowest cost and leave the less desirable deposits for future exploitation.

Uranium is widely scattered over the earth's surface. The occurrence of rich deposits of uranium is somewhat infrequent, although there are many deposits which are of adequate richness to warrant their recovery at a price which seems entirely feasible from the standpoint of their utilization as energy. Based on such supplies, it has been estimated that the energy available through effective use of uranium can increase the world's potential energy resources about 23-fold. This tremendous increase in our energy reserves is assurance for meeting the world's energy needs for a long, long time ahead. In these estimates it has been assumed that all the uranium that would be produced will be effectively used for production of energy. This in turn means that the uranium must be converted to energy in a so-called "breeding" type of reactor. In this type of reactor the fissionable form of uranium as it breaks down creates new fissionable material in the form of plutonium from the non-fissionable form of uranium which is the major type occurring in nature. This plutonium thus created is itself a fuel and can convert additional non-fissionable uranium into plutonium. This cycle would then continue until all the uranium atoms originally present were fissioned to release energy. The breeding reaction has been demonstrated and is felt to be entirely feasible. The techniques required for carrying out the breeding reaction to produce economic power have, however, by no means been demonstrated and may be a considerable distance in the future.

The research that has been carried out on the atom which led to the discovery of the production of energy through fissioning of uranium has pointed out many other ways in which tremendous quantities of energy might be obtained through what are known as thermo-nuclear or fusion reactions. The bombardment of lithium with hydrogen atoms, either in their normal form or in the form of heavy hydrogen, can convert lithium into helium and in so doing release very large amounts of energy. To make such a reaction self-sustaining, however, would require temperatures (or the equivalent thereof) in the reaction region comparable to that of the sun, or even higher. No way of containing such reactions or extracting heat therefrom in usable form has been demonstrated, but with the advances being made through research it is entirely possible that solutions to these problems will at some time be found. If this is done, there will be a tremendously greater expansion of our potential energy sources, to the point where there should be no further concern over future energy needs.

The field of application for atomic energy that appears most promising at the present time is for production of electric power. The feasibility of making electric power in this way has been well demonstrated, but atomic energy, at least in the United States, faces very keen competition from the fossil fuels. Fossil fuels represent very cheap forms of energy in the United States although this is true to a lesser degree in some other parts of the world. The cost of electricity in the United States at the generating station averages about 0.6-0.8 cents per KW hour. Of this cost some 0.3 to 0.4 cents represents fuel which is the energy source. The cost of the electricity to the normal household is much greater than this due to the smaller amount of electricity used and the relatively high cost of distribution. A rough average for the cost to the domestic consumer is about 3 cents per KW hour for large users, and 5 cents per KW hour for small users. Large industrial consumers of electicity, due to the lower cost of distribution going with the large use, can obtain electricity in the region of 0.8-1.1 cents per KW hour on the average. Modern installations with favorable fuel cost can produce electricity at the generating station at an appreciably lower figure than those given above.

The methods now being considered for utilization of atomic energy for production of electricity follow much the same procedure as is used in obtaining electric energy from the fossil fuels. Heat is first liberated and this heat is converted into steam which in turn is used to drive an electric generator that produces the electricity. Roughly about one-third to one-fourth of the heat energy is converted into electric energy. The atomic energy reactor with its steam generating facilities would therefore replace the furnace and boiler used to generate steam in the conventional plant. The savings that would come from the use of atomic energy would therefore be the savings in fuel cost. While uranium is potentially a cheap form of energy, its cost is not negligible and considering the fact that, in order to fully utilize the uranium, chemical processing of the uranium may be required several times before it is used up, there will be some equivalent to fuel cost in an atomic reactor. How great this equivalent of fuel cost will be is not really known and with the increasing advances from research this cost will certainly decrease. There is a good possibility, however, that for the reasonably near future the equivalent fuel cost for uranium may be around half that for conventional fuel, or around 0.15-0.2 cents per KW hour, and these figures in turn would represent the fuel cost saving due to the use of atomic energy. This saving would represent about 25 per cent of the present cost of electricity at the generating station, or about 4 per cent of the cost of electricity to the domestic consumer.

The possible saving of fuel through the use of an atomic reactor may be more than offset by the present indicated high cost of the atomic reactor compared to the furnace and boiler for conventional fuels. The investment in a conventional power plant for normal fuels averages about $150 per KW of capacity. There are certainly no very accurate figures available on the cost of equipment for a power plant using an atomic reactor and the costs that have been estimated should be reduced with further progress in research. Based on the present state of the art, however, it appears unlikely that the cost of the atomic power plant would be less than $300 per KW of capacity, which is about twice that of the conventional unit. Assuming for the moment that $150 per KW of capacity is representative of the difference in investment between an atomic power plant and the conventional power plant, this added investment will increase the cost of atomic power conipared to power from conventional fuels. The greater investment will represent greater maintenance and greater amortization, and in addition the public utility company will require some return on the greater investment involved. The net effect of this greater investment will therefore be to increase the cost of electric power by at least 0.3 cents per KW hour, which is greater than the fuel saving indicated above. Based on these figures, therefore, it would appear that in the present stage of its development atomic energy cannot on the average compete with conventional fuels for the production of electric power in the United States. This situation will become more favorable in locations where fuel costs are high due to the transportation involved. Appreciable advances in the art, however, will be required for atomic energy to be widely used for production of electric energy in the United States and to a lesser degree this conclusion applies to other parts of the world.

The above discussion on electric power costs may appear somewhat pessimistic, but it should be realized that electric energy is available in the United States today at low cost. The real importance of atomic energy lies in the fact that it assures relatively

low-cost energy for a long time ahead in the future rather than any immediate effect it may have on our present low cost of electric energy.

The Atomic Energy Commission of the United States is carrying out a vigorous research program directed toward improving the technology of producing electricity with atomic reactors. A number of private enterprises are also getting interested in this problem and it is felt that definite advances will be made. The program of the Atomic Energy Commission is primarily concerned with investigating five different types of reactors. One of these will represent a large-scale development program and the other types of reactors will be investigated on an intermediate or pilot plant scale. The cost of this program, including a portion of the development effort, is approximately $200,000,000.

The large-scale reactor development is concerned with the pressurized water reactor. This reactor uses normal water as a cooling medium to remove the heat liberated in the atomic reactions and also as a moderator. The fuel used will be slightly enriched uranium. The schematic drawing of this reactor is shown in Figure 1. The uranium-containing fuel elements are encased in protective metal jackets and heat is removed from these jackets by normal water which circulates past the fuel elements at high velocity. Pressure is maintained on this circulating water so that boiling does not occur, and the heat in this water is used to generate steam in a boiler outside of the reactor. This is done by indirectly transferring the heat from the circulating water to a separate body of water in the boiler. The reactor itself will run at a pressure of 2,000 psi to keep the circulating water from boiling, and steam will be generated at a pressure of 600 psi.

Arrangements have been made with the Duquesne Light Co. of Pittsburgh to install a pressurized water reactor and use it for generating electricity which will be put into the normal distribution system. The reactor will generate over 260,000 kilowatts of heat which will be converted into 60,000 or more kilowatts of electricity. It is expected that the construction and operation of this large reactor will give valuable experience which will point the way toward reducing the cost of subsequent reactors of this type or of somewhat different type. It is not expected that this reactor will generate electricity that will be competitive with that generated from conventional fuels, the added cost being largely borne by the Atomic Energy Commission in order to get some real operating experience. There may be some corrosion problems to be solved. It should be pointed out that it would be possible to operate a reactor of this type with uranium as it occurs in nature, provided heavy water rather than light water is used in the reactor.

Closely related to the pressurized water reactor is the boiling water type of reactor. This reactor can use either normal or heavy water as the cooling medium and moderator. The fuel in the case of a light water reactor would be uranium enriched in U_{235}, whereas in the case of heavy water, normal uranium could be used. The heat of the atomic reactions is given up to the water which in turn boils, and the steam which is liberated can be used to drive an electric generator. The steam is condensed and returned to the reactor. One of the principal advantages of the boiling water reactor over the pressurized water reactor is that steam used to drive the turbine can be at considerably higher pressure since, compared to the pressurized water reactor, one heat exchange step is eliminated. One disadvantage of the boiling water reactor is that the steam produced may carry with it some radioactivity which will make maintenance of the turbine more difficult. Also, where heavy water is used, great care will be required to prevent leakage of steam from the turbine.

The experimental boiling water reactor that is planned, a diagram of which is shown in Figure 2, will have a heat generating capacity of 20,000 kilowatts and will produce about 5,000 kilowatts of electricity. This reactor will operate on light water and will require enriched uranium. As in the case of the pressurized water reactor, there may be some corrosion problems.

A third reactor that will be investigated in the program has been termed a "homogeneous" reactor. In this reactor the atomic fuel, either U_{235} or U_{233}, will be present in a soluble form in heavy water. The atomic reactions that occur heat this solution, which is circulated from the reactor to a heat exchanger where the heat is indirectly transferred to water to make steam. This steam can be used to drive a turbine to generate electricity. A diagram of such a reactor is shown in Figure 3. To conserve neutrons, the reactor is surrounded by a heavy water reflector. The homogeneous reactor has two basic advantages. One is that it is very stable from a nuclear standpoint since an increase in temperature will result in expansion of the reactor fluid which will tend to lower the activity of the reactor. The second advantage is that since the atomic fuel is in solution it is more susceptible to purification and other chemical treatments than is the case where the atomic fuel is present in the form of metal. Also, since the atomic fuel is in solution, heat transfer problems have been eliminated from the reactor. The disadvantages of this system are that the solution handled is very corrosive and has very high radioactivity. The homogeneous reactor is an attractive type if the severe corrosion problems can be satisfactorily overcome.

If desired, the homogeneous reactor can be made a breeder; that is, the reactor generates more atomic fuel than it consumes. This can be done if U_{233} is used as the fuel and if outside the reactor there is a blanket of thorium in soluble form or in some other form from which heat can readily be removed and chemical reworking simplified.

FIG. 1 PRESSURIZED WATER REACTOR

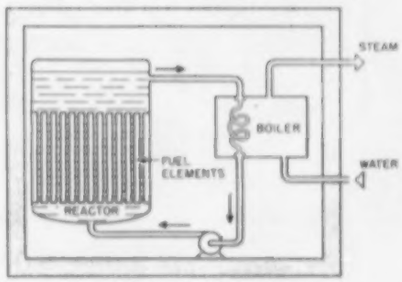


FIG. 2 BOILING WATER REACTOR

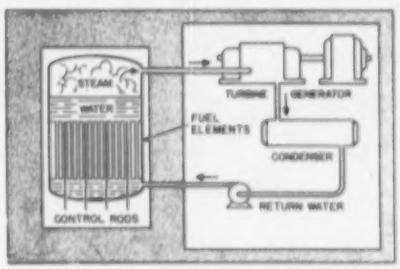


FIG. 3 HOMOGENEOUS REACTOR

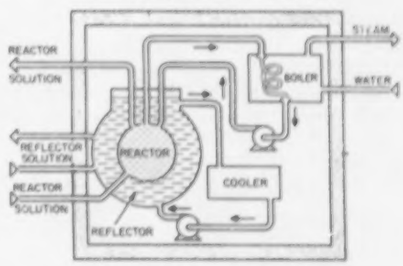
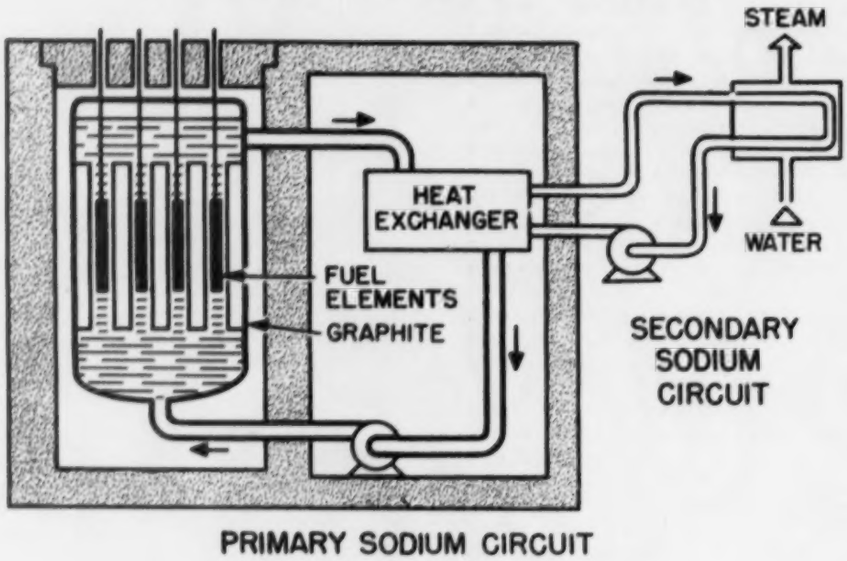


FIG. 4 SODIUM – GRAPHITE REACTOR



A small experimental reactor of the homogeneous type has been operated. This reactor had a capacity of 1,000 kilowatts of heat. The next step proposed is to build a somewhat larger reactor which incorporates some engineering changes. This reactor will have a capacity of 5,000 kilowatts of heat and will produce steam that will drive a generator. In this next step, chemical processing will also receive major attention. Following this step it is proposed to go to a reactor of 65,000 kilowatts of heat capacity.

A fourth type of reactor in the program is known as the sodium reactor experiment. In this reactor, enriched uranium is used as a fuel and the moderator is graphite. Cooling is accomplished through circulation of liquid sodium around the uranium metal elements and these elements are encased in a protective metal coating. A diagram of the reactor is shown in Figure 4. During the last several years considerable background has been obtained in handling liquid sodium at high temperatures and it is felt that this technique is quite well developed. Graphite moderators of course have been extensively used.

On the whole, there are few foreseen difficulties with the sodium graphite reactor. The corrosion problems are not expected to be serious and the reactor is capable of delivering the heat obtained from the atomic fuel at a high temperature level. The sodium that is circulated through the reactor becomes radioactive, and at the present time it is planned to transfer the heat from this sodium to an additional sodium circuit which will not be radioactive, and this last sodium circuit will heat water to make steam. Whether the two heat exchange steps are desirable is not at this time known. By using U_{233} as a fuel instead of U_{235} the sodium graphite reactor can very likely be operated as a breeder; that is, it would make more atomic fuel than it consumes. The sodium reactor experiment will have a heat liberating capacity of about 20,000 kilowatts and it will be operated at relatively high temperature.

The fifth and last reactor on the present program is known as the Experimental Breeder Reactor—II. All of the previous reactors discussed utilized primarily thermal neutrons for fissioning, whereas the experimental breeder reactor will primarily utilize neutrons of higher energy. This is done, since using the plutonium-uranium cycle a more favorable breeding ratio can be obtained with the fast neutrons. Because of its nature the reactor core for a fast neutron breeder is quite compact and this introduces certain problems of construction and cooling. The heat from the atomic reactions will be removed by a circulation of molten sodium. As in the sodium graphite reactor discussed previously, it is planned to use a circulating sodium stream which will be radioactive to heat up another sodium stream which in turn will produce the steam. The reactor core will be surrounded by a blanket of uranium in which the breeding occurs, the uranium being converted in part into plutonium. A diagram of this type of reactor is shown in Figure 5.

A small fast neutron breeder-type reactor has been constructed and operated, and the feasibility of breeding has been demonstrated. The present reactor has a heat generating capacity of about 1,400 kilowatts. It is now planned to build a larger breeder reactor to be known as Experimental Breeder Reactor-II, which has a heat generating capacity of around 63,000 kilowatts and will produce around 15,000 kilowatts of electricity.

With the program on reactors now planned by the Atomic Energy Commission, and also with the work that is being started by various private companies, it is felt that real progress will be made on solving the technical problems involved in producing electricity from atomic energy that will be competitive in cost with electricity produced from conventional fuels. There are a great many problems to be overcome and it is difficult to forecast when atomic energy will be widely applied in the U. S. for production of electricity. It would certainly not be surprising by 1975 for one-third of the new electric power installations in the United States in that year to be based on atomic energy. On this basis, by 1975 perhaps 6 percent of the total electricity generated in the United States would come from atomic energy. If this should turn out to be the case, and there should be some moderate use of atomic energy for ship propulsion, then about 1.5 percent of the total energy needed in the United States would be supplied from atomic reactions. From 1975 on atomic energy should see much wider use.

The main uses for energy other than for production of electric power are for transportation, space heating (particularly home heating) and for certain industrial uses. When uranium is fissioned to produce energy, radioactive materials are created and other particles known as neutrons are released. These radiations and particles are injurious to man, and to give adequate protection it is necessary to have a large and massive shield around the atomic reactor. Such a shield may take the form of several feet thickness of concrete and this rules out the use of atomic energy in its present form for many types of transportation. No way has been pictured so far in which atomic energy would be useful for automobiles, trucks and buses. It may have application to airplanes for certain military uses, but it is doubtful that atomic energy will be applied for civilian air transportation. There is a possibility that atomic energy will be used to power railroad locomotives, but consideration would have to be given here to the high first cost of the atomic reactor and to the hazards that might arise should the locomotive become involved in an accident which might release radioactive material and endanger the lives of people in the area where the accident occurred. For ship propulsion, the use of atomic energy may be more feasible and it has very marked advantage for military vessels since it reduces the necessity of transporting fuel to different parts of the world under war conditions. The power requirements of many commercial vessels may not be high enough to justify the expense of the installation of an atomic reactor and there are also the

hazards in case of accidents mentioned above. Based on what is now known, it would appear that the application of atomic energy for transportation will be quite limited at least for a considerable period.

There has been some discussion of the use of atomic energy for heating of individual homes. The expense of an atomic reactor will likely be very high compared to the cost of a house and there is also the danger of scattering radioactive materials in case something goes wrong with the installation. From what is now known, the use of atomic energy for individual home heating does not appear to be a likely application. A more feasible use would be for the heating of large groups of buildings in cities. Here again, however, consideration would have to be given to the possible hazards of having an atomic reactor in populated areas. The industrial uses of energy are quite varied. It may be that atomic energy will have some place in fulfilling these needs but no detailed investigation as to the possibilities has been reported.

There are other uses for atomic energy which will likely turn out to be much more important in the near future than its use for generation of electricity or heat. Atomic reactions can and do produce new types of radioactive materials that offer powerful tools for research and the additional knowledge gained with these tools will in itself offer a very great benefit from atomic energy. Most progress has been made in using these new tools in medical and agricultural research, but they are beginning to be used very widely in all forms of research.

It has been stated by a leading authority in the field that the use of radioactive isotopes produced in atomic reactors has already advanced the state of medical knowledge by the equivalent of what it would otherwise be 25 years from now. In particular, radioactive isotopes have allowed progress to be made on diseases that frequently occur among older people, such as cancer, heart ailments, arthritis, and the like. Medical research using these new radioactive isotopes and materials made therefrom is being carried out along three main lines; one is to obtain a better knowledge of biological processes, a second is for diagnosis of diseases, and a third for treatment of diseases.

Radioactive iodine, which can be produced in atomic reactors, has proved very helpful in the treatment of thyroid cancer and as an aid for studying basal metabolism. Radioactive phosphorus gives excellent control of a normally fatal disease which is caused by hyperactive bone-marrow producing too many red blood corpuscles. Radiation from active isotopes has been helpful in treating cancer of various forms. In particular, radioactive iodine and phosphorus have allowed accurate determination of the location of brain tumors and this in turn has aided where surgery is applied for removal of the tumor. Numerous other examples of the importance of radioactive isotopes could be given and new uses are being found every day.

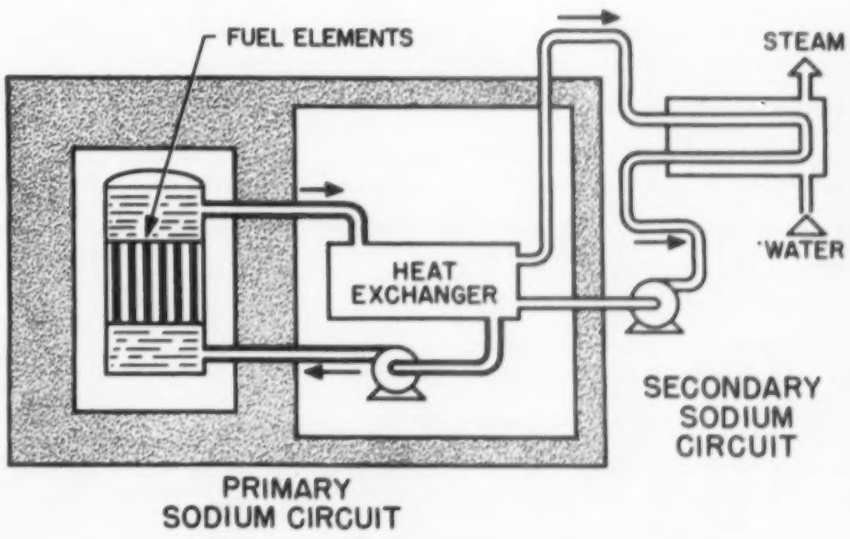
In agriculture much new information has been obtained through the use of radioactive isotopes as tracers. A better knowledge has been obtained as to the value of the various types of fertilizers and the depth in the ground at which they should be applied to give most effective results. Through the use of isotopes it has been found that plants are capable of utilizing fertilizers by absorption through their foliage in addition to absorption through their roots, and this in turn may lead to new methods of stimulating plant growth. Radioactivity increases mutation of plants and animals and makes possible the more rapid development of new species which may be more disease-resistant or have other valuable features. It can be expected that through the knowledge gained in studies with radioactive isotopes, the world's food supply can be very substantially increased.

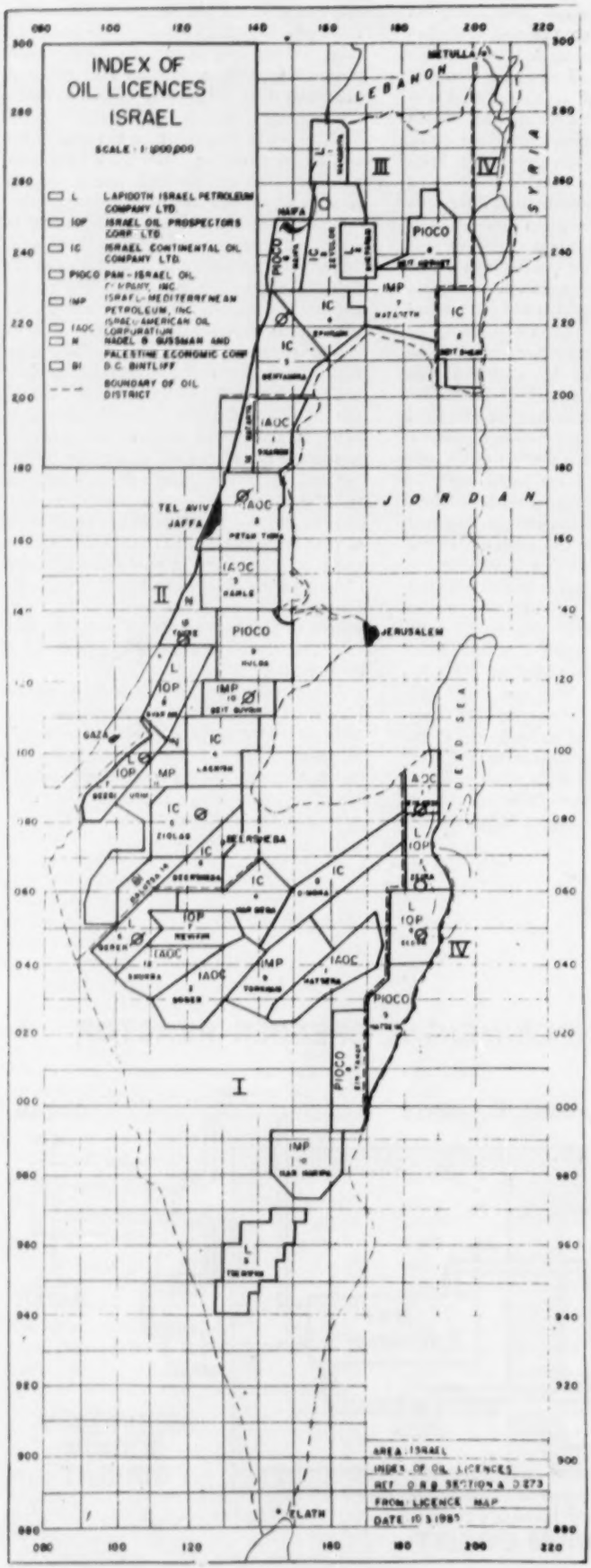
A promising use for a portion of the energy liberated in atomic reactors is for promoting chemical reactions of various types. About 10 per cent of the energy liberated in an atomic pile is in the form of gamma radiation and this radiation is very penetrating. Gamma radiation is known to cause polymerization of hydrocarbons and cracking of hydrocarbons, depending on the conditions and the materials involved. It is also known that gamma radiation will activate materials so that they can enter into reactions where for various reasons these reactions will not occur without activation. The amount of energy required for this activation can often be very small and little radiant energy is therefore required. It is really a question of sort of pushing the reaction over the hill so it will then go on of its own accord. The bulk of the processes used in refining operations, other than physical separation, involve cracking and polymerization. Activation should be helpful in many processes in the petrochemical field. In addition to reactors, the waste materials therefrom or materials activated in a reactor such as Cobalt 60, can be used as sources of gamma radiation.

In light of the above considerations, it may well develop that the application of radiant energy from atomic reactions is the field of application of atomic energy of particular interest to the oil refiner and petrochemical manufacturer. In order to evaluate more definitely the possibilities in this field, the Esso Research and Engineering Co., which is the research affiliate of the Standard Oil Co. (N. J.) group, is planning a thorough study of the possibilities of the use of radiant energy for carrying out various reactions. Most emphasis will be placed on gamma radiation, but studies will also be made of the application of beta rays and neutron radiation. A new radiation laboratory is now nearing completion at the Esso Research Center, near Elizabeth, N. J., which will utilize as a source of gamma radiation Cobalt 60. This cobalt source will have a strength of about 3,600 curies.

At this time two great benefits to mankind are foreseen from atomic energy. One is to extend greatly the world's potential supplies of concentrated energy. The second is the contribution that atomic energy has made and is making to medicine, agriculture and research in general.

FIG. 5 EXPERIMENTAL BREEDER REACTOR





Drilling rig in center foreground and specially constructed access road near Massada, Israel, with Dead Sea shoreline in background.

Independent operators

By Ernest Aschner

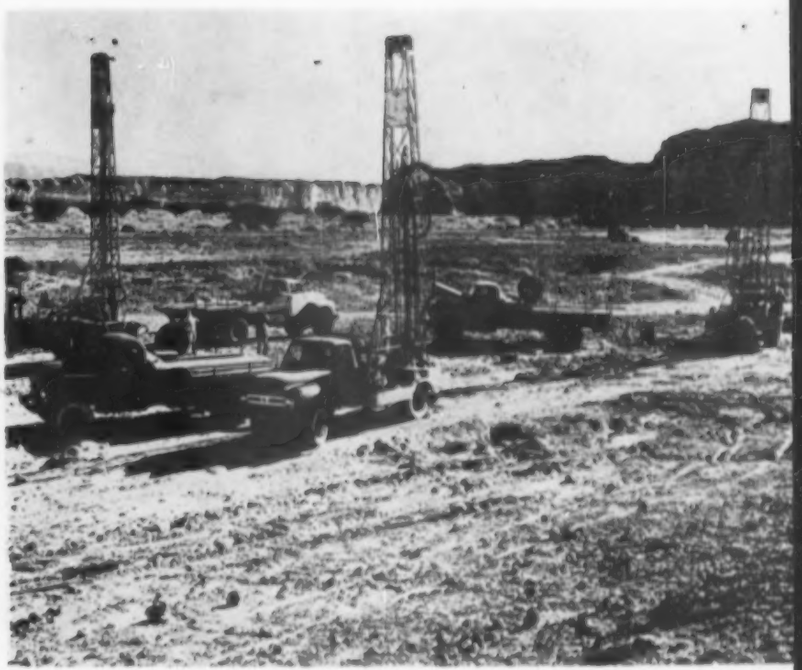
THE SEARCH for oil in Israel, spurred by occasional shows of gas and other favorable geological and geophysical indications, continues unabated by the eight international companies holding prospecting licenses covering 2,700,000 acres, representing 50 percent of Israel's total land area.

Several wells, some of them going down beyond 9,000 feet, have been abandoned as dry holes in areas bordering the Dead Sea, on Mt. Carmel and in the coastal area. There are, however, numerous promising structures that have not yet been tried in these and other areas. Drills are active in practically all parts of the country.

Shows of gas occurred near Petah Tikva, north of Tel Aviv, at a shallow depth of 659 feet. Subsequent drilling nearby confirmed that a low pressure gas reserve area may have been located, though it is doubtful if the semi-proven area can be developed commercially.

The show occurred on a license area held by Israel-American Oil Corp., which had previously drilled wells on its Boqer license in the Negev, and on its Engedi license southwest of the Dead Sea, without results. The Negev operation was abandoned at 9,073 feet in either lower Triassic

Gan Yavne settlement, 18 miles south of Tel Aviv, showing new rig installed in June 1955 by Israel-American Oil Corporation after a gas eruption had damaged a lighter rig on this location.



Mobile equipment of Weizmann Institute, Rehovot, Israel, carrying out research drilling and seismological tests in the Negev south of the Dead Sea.

explore ISRAEL'S OIL POTENTIAL

or Permian formation. The Dead Sea operation was bottomed in gravel beds at 2,390 feet.

Israel-American, which was founded by the Husky Oil Co. of Cody, Wyoming and the New York investment firm Bear Stearns & Co., has recently acquired a 25 percent interest in the Gan Yavne license which is registered in the name of Nadel and Gussman, Tulsa, Okla., and the Palestine Economic Corp., New York. In this area, located 18 miles south of Tel Aviv, a gas blow-out occurred last June at a depth of 3,000 feet, damaging the rig, an Ideco H-25. The rig has since been replaced by a heavier unit, an Ideco H-35, and drilling has been resumed.

Operations are also proceeding at Massada, near the Dead Sea, where Lapidot-Israel Petroleum Company Ltd., Tel Aviv, is drilling below 3,000 feet and had some asphalt showing at shallow depths. The same company is now preparing to drill at Huleiqat in the Negev on a spot near the plugged hole drilled by the Iraq Petroleum Co. prior to the outbreak of Arab-Israeli hostilities in 1948. Extensive tests have confirmed that the original well is located on or near the top of a structure. Lapidot-Israel is also ready to move into the Jebel Quarn location near the Dead Sea where promising structures have been pinpointed. Prior to commencing on the location, the company will have to bring water and access road to the point of operations.

Lapidot is affiliated with AMPAL, American-Israel Corp., New York, through American-Israel Petroleum Corp., New York. Ownership of Lapidot is 50 per cent American and 50 per cent Israeli. The Israel partner is Mekorot Water Works Ltd., Tel Aviv. In several areas Lapidot is cooperating with Israel Oil Prospectors Corp. Ltd., owned by Israeli, Swiss and U.S. interests.

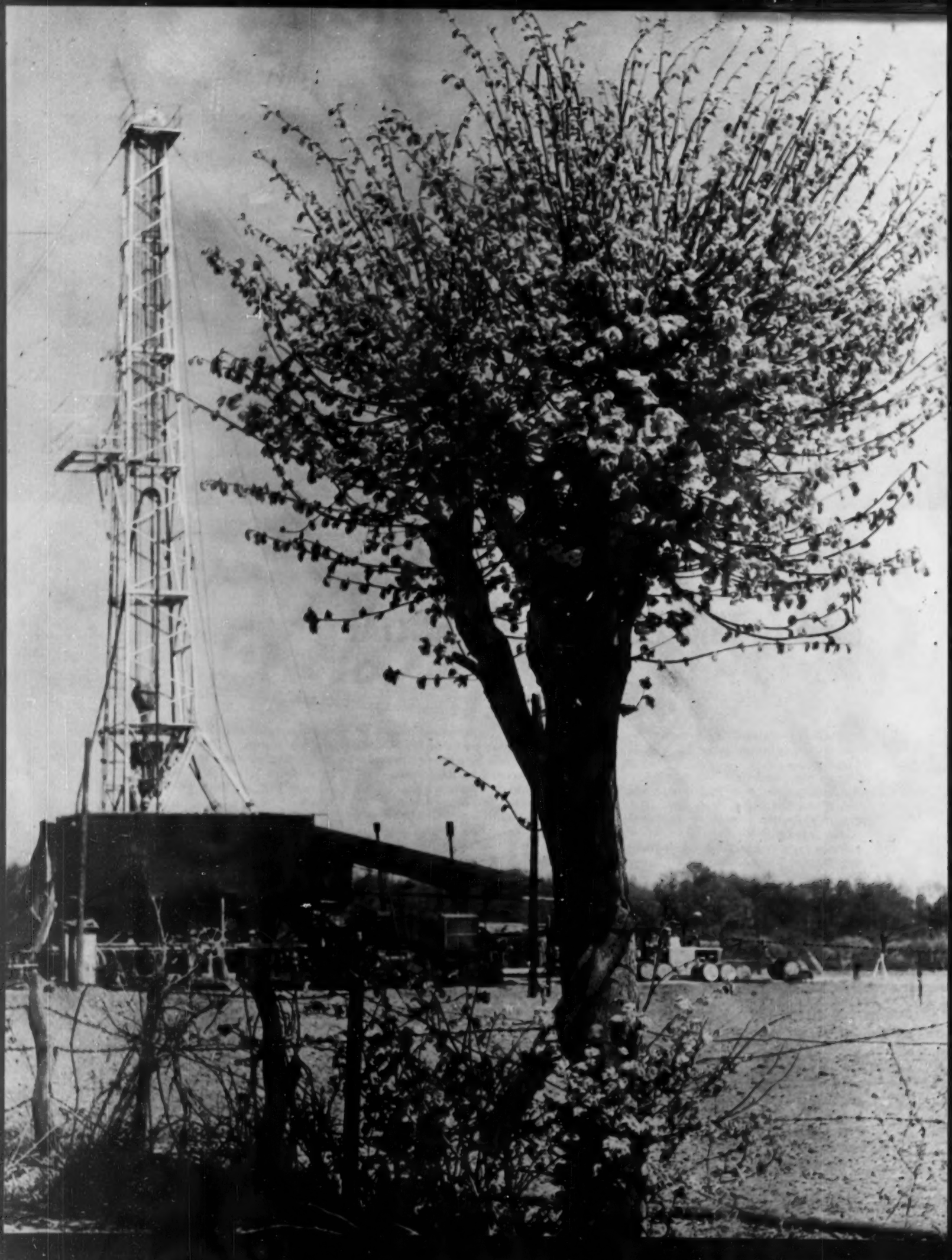
In another operation, Israel-Mediterranean Petroleum Co. and Pan-Israel Oil Co., Inc., of Panama are deep drilling beyond 6,600 feet near Kurnub in the Negev. These companies, affiliates of William F. Buckley and the Pantepec Oil Co. interests of the U.S., have their operations handled by Tri-Continent Drilling Co. of Houston, which is a subsidiary of Pantepec.

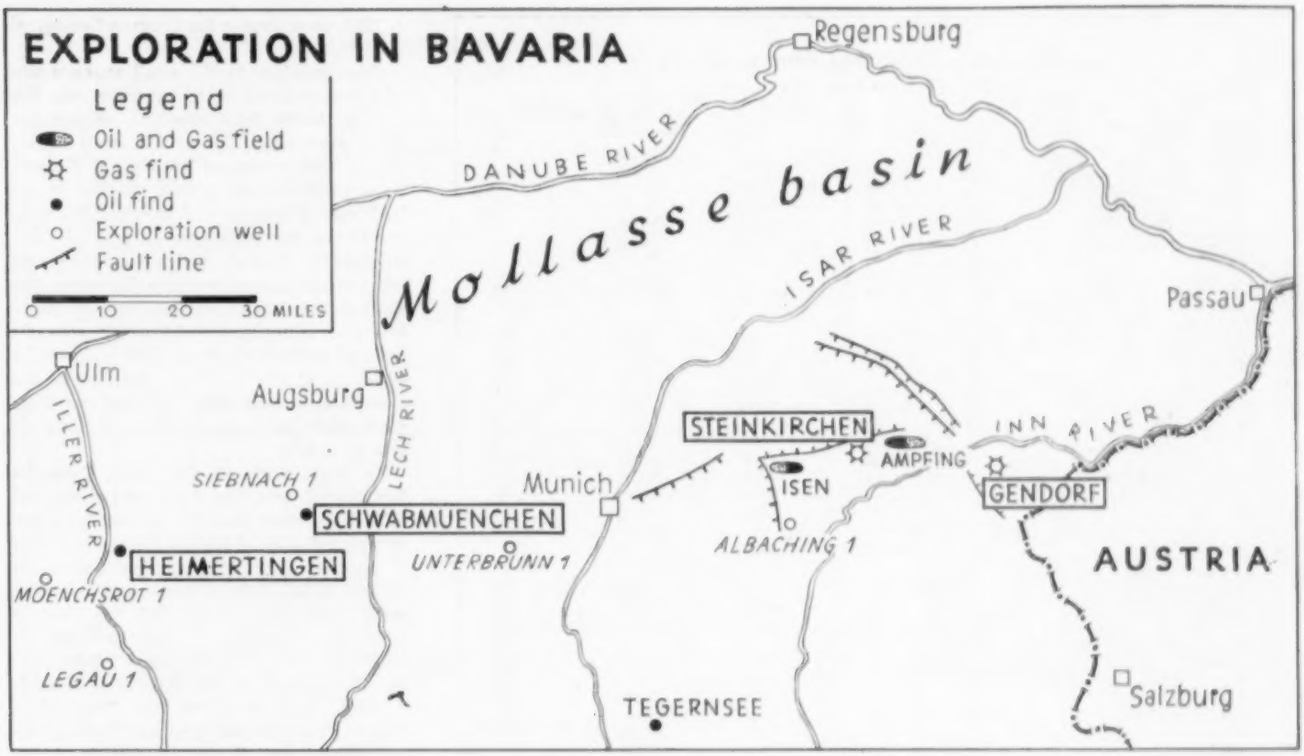
The well, which is being drilled with an Ideco-711, showed gas at 790 feet. Previously, Tri-Continent had drilled a dry hole to 8,000 feet on the Kfar Menachem location 17 miles southwest of Jerusalem. They are now engaged in geological surveys in the vicinity of Haifa and in Galilee and have picked a location in the Haifa area for spudding in a new well in the near future.

Israel Continental Oil Co. Ltd. of Calgary, Canada, has recently abandoned its deep test at Zichron Jacob on Mt. Carmel after reaching a depth of 9,500 feet. Operations by this company were moved to its Kurdani license area north of Haifa with drilling scheduled to commence shortly.

Israel's oil legislation and administration aims at achieving maximum oil discovery and production in the minimum reasonable time. The country has been opened to international competition and, unlike other Middle Eastern countries, the territory is not limited to a single monopoly. Royalties amount to 1/8, the same as in the U.S., and operators enjoy the benefits of depletion allowance similar to U.S. tax law provisions.

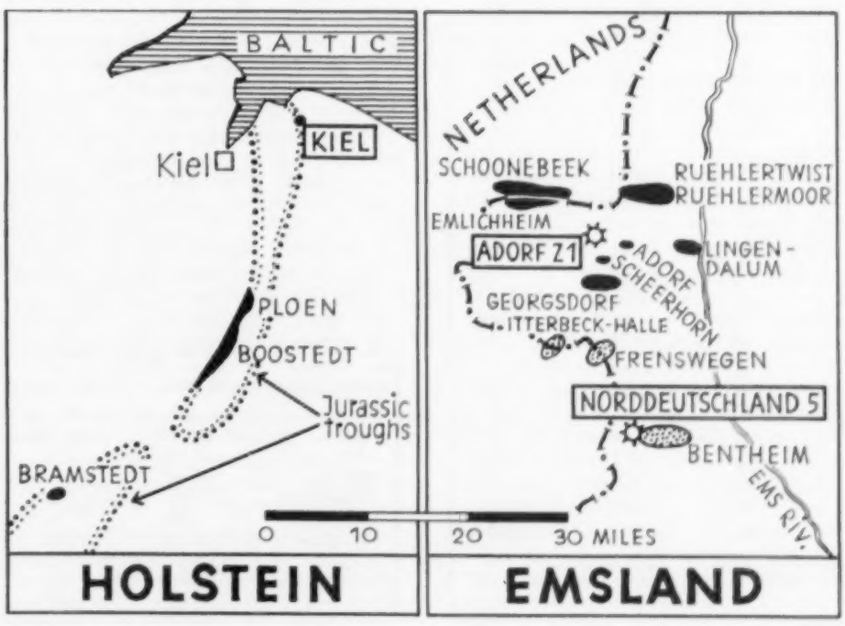
Discovery of oil in Israel would obviate the necessity of importing crude oil and petroleum products now being bought by Israel abroad to the tune of some $36,000,000 a year.





Facing page: cantilever rig in Hemmelte-West field in the Weser-Ems district. Deutsche Vacuum photo.

new finds in GERMANY



By Alfred M. Stahmer

EXPLORATION in Germany continued at a high level in 1954 and through the first half of 1955. The total footage drilled was 2,164,265 in 1954 and this was estimated to rise by 20 percent to 2.6 million feet in 1955, on the basis of drilling now planned.

No important discoveries resulted from this exploration, but a series of smaller finds was made which, added to the intensive exploration in the previous decade, had its good effects in increased production.

Total German production in 1954 was 51,604 barrels daily, or 2.66 million tons for the year, exceeding by 461 percent the levels of 1947. Production in 1955 on the basis of the first six months, is estimated to reach 58,200 b/d, or three million tons, which is 12.7 percent over 1954.

Natural gas production rose from 87.5 million cubic meters in 1954 to 99.2 million cubic meters in 1955. Reserves showed a rise of 18.9 percent over 1954 to 463,293,000 barrels, or 65.4 million tons as of January

GERMAN CRUDE OIL PRODUCTION, FIRST HALF OF 1955

(Metric Tons and Barrels Daily*)

	June 1955		1st Half of 1955	
Emsland	Metric Tons	b/d	Metric Tons	b/d
Adorf	—	—	69	3
Emlichheim	13,180	3,110	79,750	3,121
Georgsdorf	21,102	4,980	115,233	4,510
Lingen	10,087	2,380	59,843	2,342
Ruehlermoor	27,608	6,515	161,666	6,327
Ruehlertwist	12,190	2,877	74,120	2,900
Scheerhorn	9,283	2,191	56,687	2,218
	93,450	22,053	547,368	21,423
Weser-Ems				
Etzel	244	57	1,488	58
Ostenwalde	279	66	1,249	50
Liener	519	122	2,604	101
Molbergen	1,428	337	6,675	261
Hemmelte-West	10,899	2,572	67,023	2,623
Quakenbrueck	222	52	1,335	52
Bockstedt	1,266	299	6,622	259
Aldorf	8,168	1,928	50,020	1,958
Dueste-Wietingsmoor	4,871	1,149	22,555	883
Barenburg	5,933	1,400	30,557	1,196
Voigtei	4,000	944	20,288	794
	37,829	8,926	210,416	8,235
Hanover				
Meckelfeld	127	30	789	31
Steimbke	4,858	1,146	30,178	1,181
Suderbruch	12,620	2,978	78,672	3,079
Eilte	5	1	55	2
Hademstorf	645	152	3,257	127
Thaeren	1,383	326	8,214	321
Wietze	2,207	521	13,375	523
Fuhrberg-Hambuehren	3,084	728	18,479	723
Nienhagen-Haenigsen	7,594	1,792	48,658	1,904
Wathlingen	788	186	5,048	197
Eicklingen-Wienhausen	945	223	4,701	183
Eldingen	7,873	1,858	47,641	1,864
Hohne	13,816	3,260	83,625	3,272
Hankensbuettel	14,325	3,381	70,203	2,748
Oerrel-Sued	1,422	335	6,769	265
Wesendorf	6,104	1,440	36,498	1,428
Varhop	1,467	346	12,287	481
Ehra	—	—	81	3
Gifhorn	141	33	910	36
Calberlah	36	8	254	10
Lehrte	1,723	407	10,169	398
Kronsberg-Pattensen	896	211	5,005	196
Eddesse-Oelheim	4,296	1,014	26,308	1,030
Meerdorf	—	—	310	12
Ruehme	1,078	254	6,967	272
Vechelde	190	44	661	26
Oberg	428	101	2,810	109
Moelme	188	44	948	37
Braistedt	252	59	1,508	60
Hohenassel	2,066	487	12,213	478
	90,557	21,365	536,593	20,996
Holstein-Hamburg				
Heide	6,650	1,569	38,620	1,511
Kiel	207	49	428	17
Ploen	5,187	1,224	29,629	1,160
Boostedt	9,030	2,131	50,883	1,991
Bramstedt	3,296	778	12,737	498
Hohenhorn	—	—	150	6
Reitbrook	5,099	1,203	30,010	1,174
	29,469	6,954	162,457	6,357
Upper Rhine Valley				
Stockstadt	5,030	1,187	28,195	1,103
Wattenheim	109	26	627	24
Dudenhofen	40	9	85	3
Rot	833	197	5,754	225
Forst-Weiher	166	39	962	38
Weingarten	378	89	1,947	76
From Production Tests	3	—	13	1
	6,559	1,548	37,583	1,470
Bavaria				
Heimertingen	14	3	89	3
Isen	56	13	325	13
Ampfing	923	218	2,703	106
	933	234	3,117	122
TOTAL	258,857	61,080	1,497,534	58,603

*Conversion factor used is 7.084 barrels per metric ton. Barrel totals vary slightly due to rounding.

1, 1955, according to the German Geological Survey.

Corresponding to the small average size of German fields, which average only 970 b/d or 50,000 tons annually, exploration finds were small. Of the 518 wells drilled during 1954, a total of 335 were crude producers and 13 came in with gas. The report in WORLD PETROLEUM of October last year mentioned the promising oil and gas discoveries in Bavaria and some other new oil deposits in northwestern Germany, the most outstanding of which is Hankensbuettel near Gifhorn, a field which recently reached a yield of about 3,542 b/d or 15,000 tons of crude oil per month. In the meantime several other oil and gas finds were made in all oil provinces of the Federal Republic.

To begin with, in the north, Deutsche Erdoel-AG. late this April was successful with its wildcat Kiel 4, located about ten miles northwest of Kiel at the eastern edge of the deep Jurassic trough running across Middle Holstein from north to south. The same sandstone horizon of the Dogger (Jurassic), which is the pay in the fields Ploen and Boostedt, was met oil-bearing in the exploration well Kiel 4 at a depth between 5,750 to 5,800 feet. These two deposits are situated south of Kiel at the western border of this very trough. The well Kiel 4 is pumping about 62.8 to 75.5 barrels of crude per day, the specific gravity being 0.863. Meanwhile, a second well, Kiel 5, was brought in as producer.

The main efforts in the old Hanoverian oil province were concentrated on the further development of the field Hankensbuettel. Just as in Holstein, the edge of a deep Jurassic basin is explored here. Nearby Hankensbuettel, the field Oerrel-Sued was discovered. Further to the southwest, between Oerrel-Sued and Hohne, the wildcat well Wesendorf-Nord, owned by the joint interest Deutsche Erdoel-AG.-Gewerkschaft Elwerath-Preussag, struck some oil likewise in the Dogger formation at a depth between 4,605 and 4,620 feet.

In the Weser-Ems district, Wintershall AG. discovered the oil field Dueste in October 1954, which, structurally, represents a typical stratigraphic trap found by reflection seismic investigations. In the neighborhood of Dueste, which is situated

NATURAL GAS PRODUCTION—FIRST HALF 1955

	Thousands of Cubic Meters	Millions of Cubic Feet
Rehden	46,183	1,652
Bentheim	17,409	615
Itterbeck-Halle	11,821	417
Stockstadt	11,283	398
Frenswegen	8,271	292
Mungstadt	3,577	126
	99,174	3,500

ANNUAL PRODUCTION AND FOOTAGE DRILLED

(Various Companies in 1954)

Company	Production Tons	Production b/d	Footage Drilled
Gewerkschaft Elwerath	613,141	11,895	503,409
Deutsche Erdoel-AG.	452,443	8,777	440,110
Wintershall AG.	428,027	8,304	313,138
Deutsche Vacuum Oel AG.	297,240	5,766	193,336
Preussische Bergwerks-und Huetten-AG.	276,317	5,360	249,529
Gewerkschaft Briggitta	246,306	4,778	223,427
Deutsche Schachtbau-u. Tiefbohrges mbH.	202,707	3,932	131,744
C. Dielmann Bergbau GmbH.	122,682	2,380	71,465
Internationale Tiefbohr KG (Itag)	13,361	259	23,406
Braunschweigische Bohrges mbH.	8,307	169	9,942
Others	5,783	112	4,759
	2,666,314	51,732	2,164,265

some miles east of the Aldorf oil fields, six dry holes had already been drilled during the war. Based on recent seismic research work, the well Dueste No. 8 was located, which encountered a sand trap of the Valendis (Lower Cretaceous) at a depth of 2,855 feet, flowing initially 35-40 cubic meters daily, 220-251 b/d through a 1/6-inch choke. Some other producers and a second part of the field—Wietingsmoor—were added during the first half of 1955. In June the Dueste field produced 4,870 tons (34,499 barrels) of crude oil.

While chances of finding new oil deposits in Emsland, which is only a small geographical extension, seem to be nearly exhausted, the deep Zechstein formation apparently offers promising prospects for the exploration of natural gas in this district. With the wildcat Adorf Z.1, a new Zechstein gas field was discovered by the joint interest C. Dielmann-Gewerkschaft Elwerath - Preussag - Wintershall in June 1955. Here, about two miles west of the stripper well Adorf No. 1, a deep structure, which was found by use of reflection seismics, proved to be gas-bearing between 9,300 and 9,440 feet. During production tests the main Dolomite of the Zechstein yielded 55,000 cubic meters daily, the well-head pressure being 278 atm. The gas consists mainly of methane and about 15 percent of carbon dioxide.

The same joint interest operating in Emsland was successful in finding a new gas-bearing block on the big Zechstein structure of Bentheim, about one mile northwest of the westernmost well of the old Bentheim gas field. The well Norddeutschland No. 5 encountered natural gas in the Plate Dolomite of the Zechstein between 5,140 and 5,210 feet. A well-head pressure of 150 atm. was measured.

A find of apparently minor importance was made by the joint operation of Deutsche Erdoel-AG. and C. Deilmann two miles west of Speyer-town in the Upper Rhine Valley at Dudenhofen. The exploration well Dudenhofen No. 1 tested a deep structure in the eastern part of the Rhine Valley graben, meeting some oil in sands of the Pechelbronn beds at a depth of about 6,500 feet. In June, Dudenhofen delivered 40 tons (283 barrels) of crude oil.

Some new finds were also made in the Molasse basin of Bavaria. Between Ampfing and Isen, the first two commercial oil fields of Bavaria, natural gas was discovered by the well Steinkirchen No. 1 between 5,470 and 5,480 feet in the Rupel sands on a concession owned by affiliates of Socony Mobil Oil Co. (Deutsche Vacuum Oel AG. and Bayerische Mineral-Industrie AG.). Production tests delivered 1,900 cubic meters of gas per hour through a 3/16-inch choke. In greater depths gas was also encountered in the Lattorf sand. Furthermore, east of Ampfing near the Austrian border, gas blew out in the wildcat Gendorf No. 1 of the consortium Deutsche Vacuum-BMI-Elwerath-Preussag. The well was brought under control and is being drilled further to test deeper horizons.

In the western part of the Molasse basin, good oil and gas traces were met in the wildcat Schwabmuenchen No. 1 of Gewerkschaft Brigitta (joint interest Elwerath-Wintershall-Brigitta) between 4,220 and 4,475 feet in the Baustein beds. Some cubic meters of crude were produced. Further exploration will prove whether a commercial output can be achieved here.

Deutsche Schachtbau-und-Tiefbohrges mbH is exploring the structure Heimertingen north of Memmingen in the area between Constance and Augsburg. While the first wells located near Heimertingen had already found oil in nearly uneconomic quantities in the Baustein zone of the fresh-water Molasse, the exploration well Heimertingen No. 4 came in with a commercial yield of nine cubic meters of crude oil per day at a depth between 5,100 and 5,120 feet at the end of July. The specific gravity of the crude is 0.840.

Pumping jack in the Suderbruch field in Hanover.

Deutsche Erdol geologist examining well cores.

General view of Creole Petroleum Corporation's Amuay Bay refinery. Capacity of the plant has been doubled by recent construction work. All photos with this article courtesy Foster Wheeler Corp.

Fluid hydroformer on stream at CREOLE'S AMUAY REFINERY

TABLE I

Approximate Properties of Hydroformer Feedstock

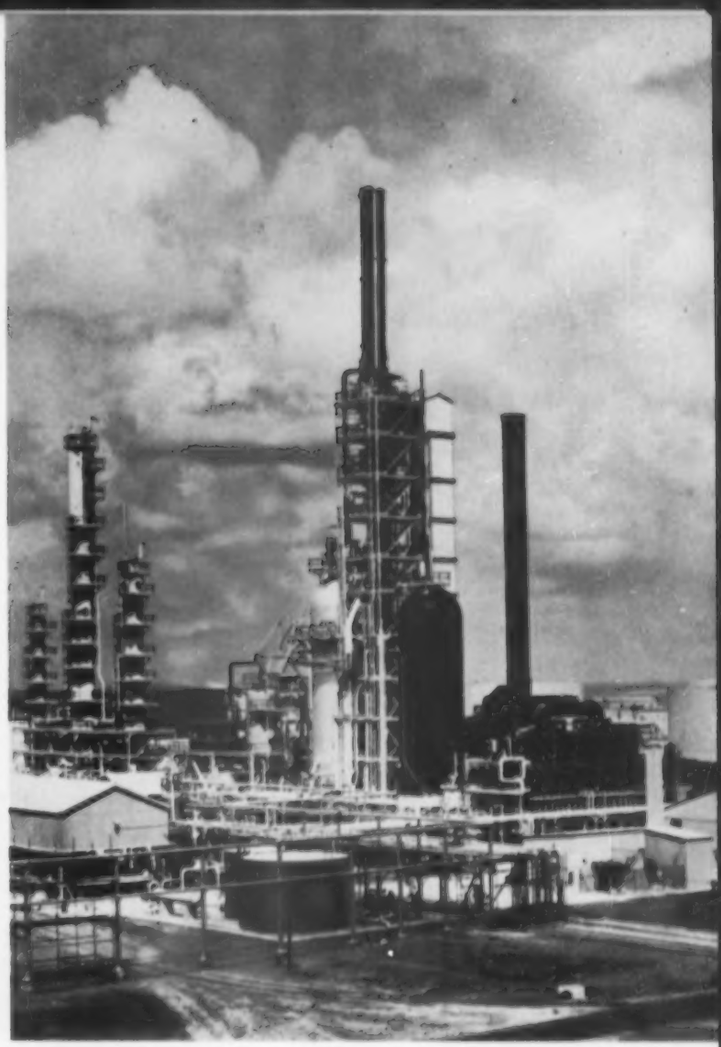
Gravity, °API	53.5
Octane Number, CFRR Clear	49.0
Sulfur, %	0.01
Naphthenes, Vol. %	31
Paraffins	51
Aromatics	17
Engler Distillation	
20%	260°F
50%	277°F
80%	303°F

CREOLE Petroleum Corp. has completed a fluid hydroformer at its Amuay refinery, a part of this refinery's recent finalized expansion project. The unit is the second of its kind built outside the United States. Engineered by Esso Research and Engineering Co. and Foster Wheeler Corp., and built by the latter, this unit has a design capacity of 11,100 b/sd. Preliminary tests after startup have yielded very satisfactory results.

Up to the present time, the gasoline output from Amuay refinery was wholly straight-run naphtha from primary distillation units. Premium motor gasoline for the Venezuelan market contained imported blendstocks. The new unit will put the refinery in a position to supply high octane blendstocks for motor and aviation gasolines to be used in the export and national markets.

The unit will process a naphtha cut obtained at the refinery's two pipestills from Tia Juana medium crude brought by pipe line from the company's holdings in the Bolivar coastal field on Lake Maracaibo. C_5/340°FVT naphtha from the pipestills is split into an overhead which is sent to a stabilizer operating in step with the splitter, and 200/340°FVT bottoms which go to in-

Atmospheric and vacuum stages of the 75,000-barrel two-stage crude distillation unit which brings plant capacity to 135,000 b/d.



Creole's 10,000-barrel fluid hydroformer is the first catalytic reformer of its type to be built in Latin America.

termediate storage for hydroformer feed. The stabilizer will produce a 10- to 12-lb. RVP C_5-free naphtha, C_4/C_5 24-lb. RVP sidestream, with overhead gas going to refinery fuel. The approximate properties of hydroformer feed are given in Table I.

Sufficient flexibility has been incorporated in the design to operate this unit within a wide range of conditions.

Tail gas from the unit will be burned as refinery fuel. Whole hydroformate will be split at the light ends unit into three fractions: light and heavy hydroformate and an aromatic cut best suited for blending into aviation gasoline. Whole hydroformate can also be stored for sale as such. The polymer bottoms will be blended into the refinery's fuel oil pool.

The light ends unit includes a stabilizer, two fractionators and facilities for preheating the feed and for cooling and finishing the various products. Fractions obtained from this unit will be approximately the following:

	CUT RANGE, NORMAL OPERATION	°FVT PART TIME OPERATION
Tail Gas	——	——
Light Hydroformate	/225	——
Aviation Aromatics	225/330	225/285
Heavy Hydroformate	330/430	285/430

Hydroformer feed is pumped through heat exchange equipment, vaporized in the feed furnace and discharged into the reactor, where it is joined by a recycle gas stream. The mixture passes through the reactor dense phase where the hydroforming reaction is completed. Products leaving the dense bed at about 900°F are disengaged from the catalyst and pass through cyclone separators where entrained catalyst is removed. The catalyst thus separated is returned to the dense bed and the relatively catalyst-free vapors are partly desuperheated by exchanging heat with recycle gas and cold feed. The reactor product vapors then enter the scrubber tower where they are further desuperheated and scrubbed of remaining catalyst particles.

The scrubber separates the small amount of polymer formed in the reactor from the hydroformate and recycle gas; the latter go overhead while the polymer, rejected to the bottoms, is pumped from the distillate drum to the stabilizer.

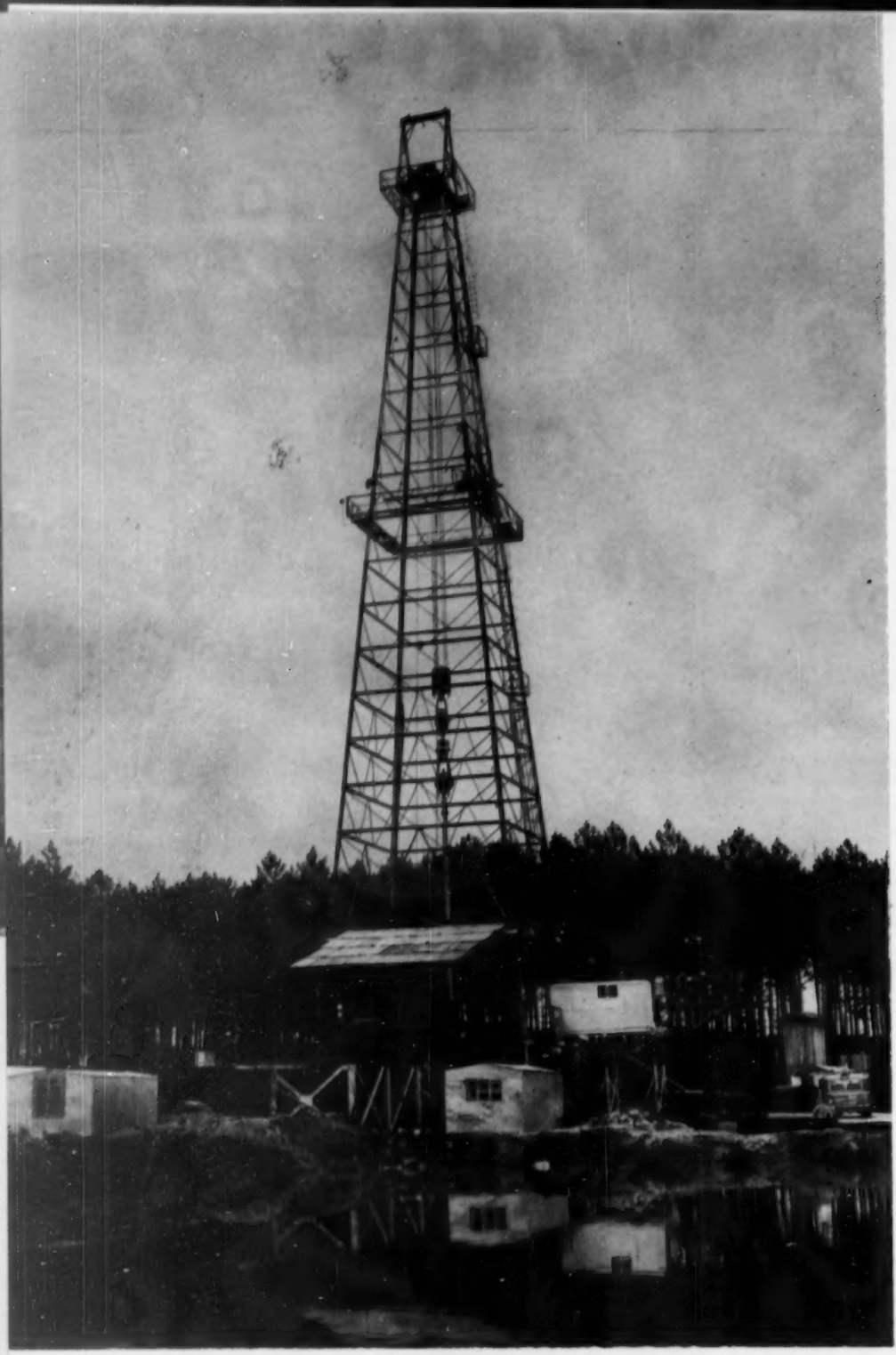
Part of the non-condensed scrubber overhead is sent as tail gas to the refinery fuel gas main through a control valve which maintains pressure in the reactor at 200 psig. A portion is compressed and sent back as recycle gas through heat exchangers and a furnace into the reactor, where it mixes with the fresh feed as described above.

Spent catalyst is withdrawn from the reactor through an internal stripper where the catalyst is freed to entrained hydrocarbons by the action of steam. It then flows to the regenerator through the spent catalyst U-bend and control riser. The catalyst is regenerated in the regenerator by burning off the carbon laid down on it during the hydroforming process. Combustion air is supplied by air compressors and enters the riser and dense phase of the regenerator.

The regenerated catalyst overflows from the regenerator dense bed into the overflow well and is returned to the reactor through the regenerated catalyst U-bend.

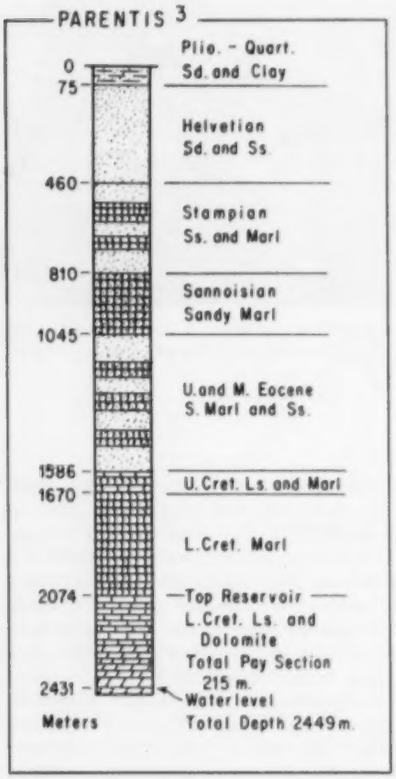
Excess heat of combustion liberated in the regenerator is used to generate steam in a cooling coil installed in the dense bed region. This steam is used at the light ends unit.

Entrained catalyst is separated from flue gases, leaving the regenerator by cyclone separators. The flue gases are then discharged to the atmosphere through the stack slide valve which maintains the pressure on the regenerator.

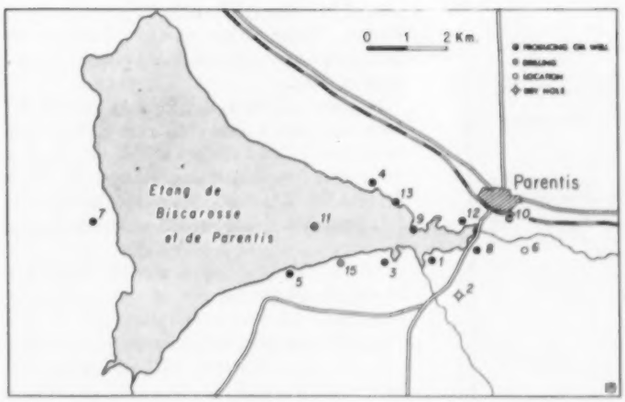


A derrick at Parentis 8, Landes. All photos used courtesy of Esso Rep S.A.F.

Generalized log of Parentis No. 3 showing stratigraphy of Parentis field.



PARENTIS DEVELOPMENT moves into center of lake



Map of Parentis field.

Loading of crude from Parentis at the Gironde terminal.

PRODUCTION from ten wells in the Parentis field in France had risen to 12,000 b/d in July as Esso Rep S.A.F. pursued its policy of steady development of its 1954 discovery. It now has become apparent that a major portion of the field lies under water.

First test of the area beneath the Etang de Biscarosse et de Parentis now is being drilled about 3,300 feet offshore and roughly between Parentis Nos. 4 and 5. Early in August the offshore test, Parentis No. 11, was drilling at 3,700 feet and had another 4,000 feet or more to drill to the objective. Relation of this well to others in the field may be observed in the accompanying map.

The Parentis oil field was discovered as a result of drilling a faulted anticline outlined by seismic survey. The Esso Rep S.A.F. obtained exploration permits covering some 4,357,980 acres in southwestern France in 1951 and exploratory work was commenced shortly thereafter. Parentis No. 1 was located on a seismic high some two kilometers southwest of the town of Parentis, near the edge of the Etang de Biscarosse et de Parentis—a large shallow lake about seven kilometers in length. After penetrating 5,000 feet of Tertiary sediments containing no indications of oil, the well entered Cretaceous sediments. Commercial oil was discovered in a dolomitized limestone of Lower Cretaceous age.

In view of the importance of the discovery, a program for proving up the Parentis field and placing it on production was put in hand immediately. Well No. 2, a low south flank well near the eastern extremity of the field, found the reservoir water logged. Further wells, however, have delimited the flanks in the eastern end of the field and given a proved productive length of about ten kilometers. The majority of the locations remaining to be drilled are situated in the lake.

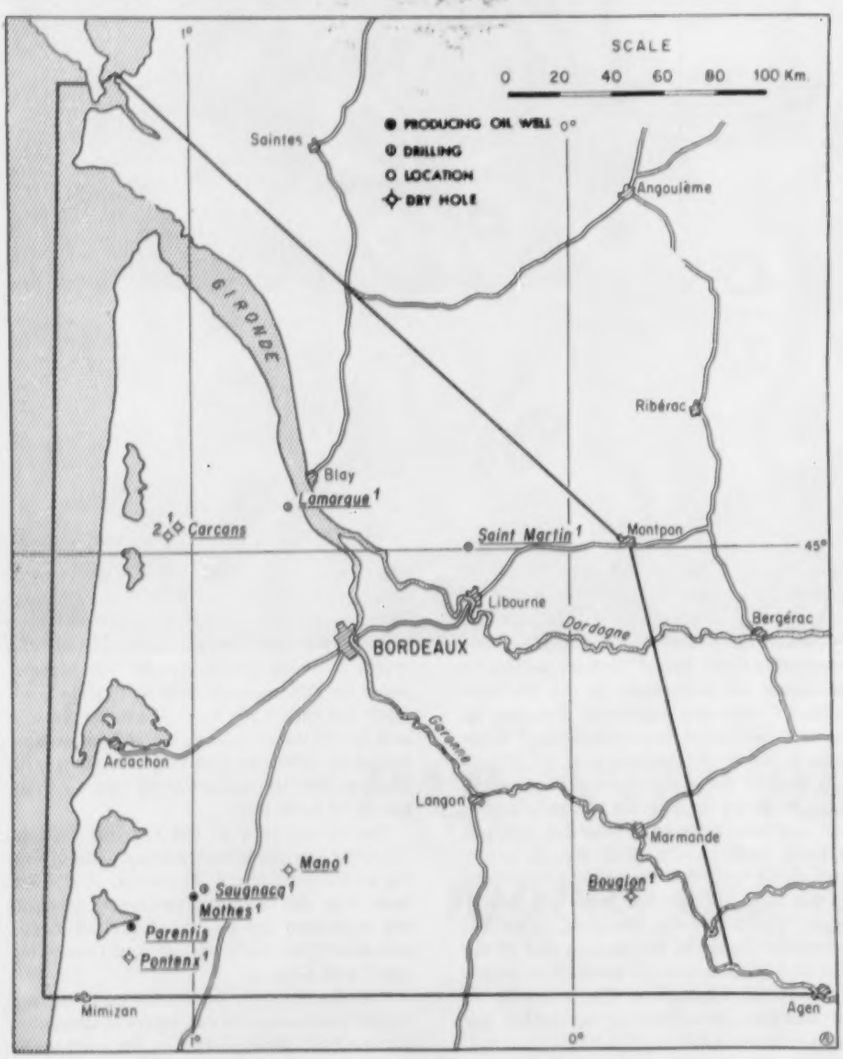
Structurally, the Parentis field is an east-west anticline, slightly assymetric with steeper dips on the south flank, terminated in the east by a zone of transverse faults striking NW-SE. The maximum productive width is about two miles. As the highest point on the reservoir proved to date is at 6,500 feet below sea level (Parentis No. 9), and an oil water interface has been established at 7,900 feet below sea level, it will be seen that the indicated oil column is in excess of 1,340 feet.

The stratigraphy of the Parentis field is illustrated in the accompanying generalized log of Parentis No. 3. From this it will be seen that the Tertiary sediments present are composed for the most part of sands and marls and the Cretaceous of limestone, marl, and dolomite.

The development of the dolomite in the Lower Cretaceous is not uniform throughout the field. Wells drilled in the northeast-

Building the derrick platform at Parentis 11, Landes.

Map of Bordeaux Basin showing location of current operations in the vicinity of Parentis.



ern part of the field and Parentis No. 7, the westernmost well, found limestone only in the reservoir section. As the porosity and permeability are better developed in the dolomite than in the limestone, the areal and vertical distribution of the dolomite is economically important. Where dolomite is developed only below the oil-water interface, a relatively poor well has resulted even though the location falls within the limits of the areal distribution of dolomite.

Wells penetrating a dolomitized reservoir average about 2,000 barrels per day. The wells which found no dolomite above the oil-water interface are relatively poor producers.

Of the wells thus far completed, Parentis Nos. 1, 3, 5, 8, 9 and 13 are dolomite producers. Wells Nos. 4, 7 and 12 are limestone producers and Parentis No. 2 was non-productive. Wells currently drilling are Nos. 10, 11 and 15.

Parentis is a sweet crude of 33° API gravity and contains very little gas. Dissolved gas/oil ratio is only 75 cubic feet per barrel. Water drive energy is ample to maintain reservoir pressure at current producing rates.

Production from the field is moved by tank car from a field gathering system to a terminal at Bec d'Ambes where it is loaded into tankers for transportation to Port Jerome. T-2 tankers must sail without a full load because of shallow water in the estuary.

In addition to the Parentis discovery, Mothes No. 1 proved the existence of an oil field some 25 kilometers northeast of the Parentis field and produces some 350 barrels per day. A second well on this structure (Saugnacq No. 1, northeast of Mothes No. 1) is now drilling.

Exploration work carried out by Esso Rep S.A.F. in the same area has included the drilling of a number of wildcat wells, none of which has been productive. These are indicated on the accompanying map. An energetic exploration program involving seismic surveys and wildcat drilling is presently being carried out. Wells drilling at the present time under this heading include St. Martin No. 1 and Lamarque No. 1.

The Bordeaux Basin in which Parentis was discovered has been considered a likely oil source for many years. Prior to last year's discovery some 200 wells had been drilled in the area by two State-owned companies. Some oil was found at Lacq and natural gas at Saint Gaudens, but the search had not been very rewarding.

Esso had been studying the basin since World War II and began active field work in 1951 when the exploration permit was granted. Some $3 million was spent before Parentis was discovered and development costs during the past year have more than doubled this sum. Ownership of the French company is largely in the hands of Standard Oil Co. (N.J.) although Gulf Oil Corp. has a minority interest. Some 19 percent of the stock is owned by French investors and the Government is to have a 10 percent interest.

LATIN AMERICA

Prospects of an important field in Brazil, possible reopening of Argentina to foreign companies and the boom in Peru and Cuba are featured in Latin American developments.

A drilling rig on the outskirts of Maracaibo is fitted with a special "antisonic" skirt. It is painted in gaudy red and white stripes since the derrick is located near the city's airport. Hamilton Wright photo.

SOUTH AMERICA'S oil operations during the past 12 months have been highlighted by important developments in several countries. In Brazil, discovery of commercial production in the Amazon basin by the Nova Olinda well offers for the first time prospects for developing a large field in that country. In Bolivia, new discoveries raised that country's production by 282 percent in one year. In Argentina, the Socal-Argentine contract and a similar offer by Standard Oil of New Jersey seemed likely to open Argentina for private development until events following the June revolution indicated revision of the contract. In Peru, intense interest and concessionary activity are being shown in the Amazon basin.

Total crude output for South America (including Trinidad) reached 2,220,200 b/d in 1954, seven percent over 1953. This amounted to about 16.25 percent of world production and retains for South America its place as third largest producing area in the world, following North America and the Middle East.

Venezuela—Venezuelan production during 1954 averaged 1,897,200 b/d, but passed the two million barrel daily mark in November and rose to 2.12 million barrels daily in the first five months of 1955. Production during 1954 was 7.3 percent over 1953. Of the 1954 total 43.46 percent was produced by Creole, 29.76 percent by Shell and 15.42 percent by Mene Grande, the three companies comprising 88.64 percent of total Venezuelan production.

At the end of February 1955, 9,328 wells were producing, of which 5,633 were pumping, 2,832 flowing and 863 gas lift. An additional 2,942 were shut in.

Sixty-six percent of production came from the western area of the Maracaibo basin and 34 percent from the eastern fields. Total gas production was 111.579 billion cubic feet, of which 72.5 percent was flared. In January 1955 the gas plant for reinjec-

tion of 137 million cubic feet daily was inaugurated seven miles offshore on Lake Maracaibo by Creole.

Total footage drilled was down slightly in 1954 to 5.49 million feet. Exploratory drilling was up, however, to 174 new wells of which 74 were producers. The outstanding discovery was a 70 percent increase in reserves in the Maracaibo basin, according to the Venezuelan government. Socony and Sinclair companies continued drilling in the Apure basin, the principal future prospect. No decision has been reached by the Venezuelan government regarding the new concessions which were announced last year.

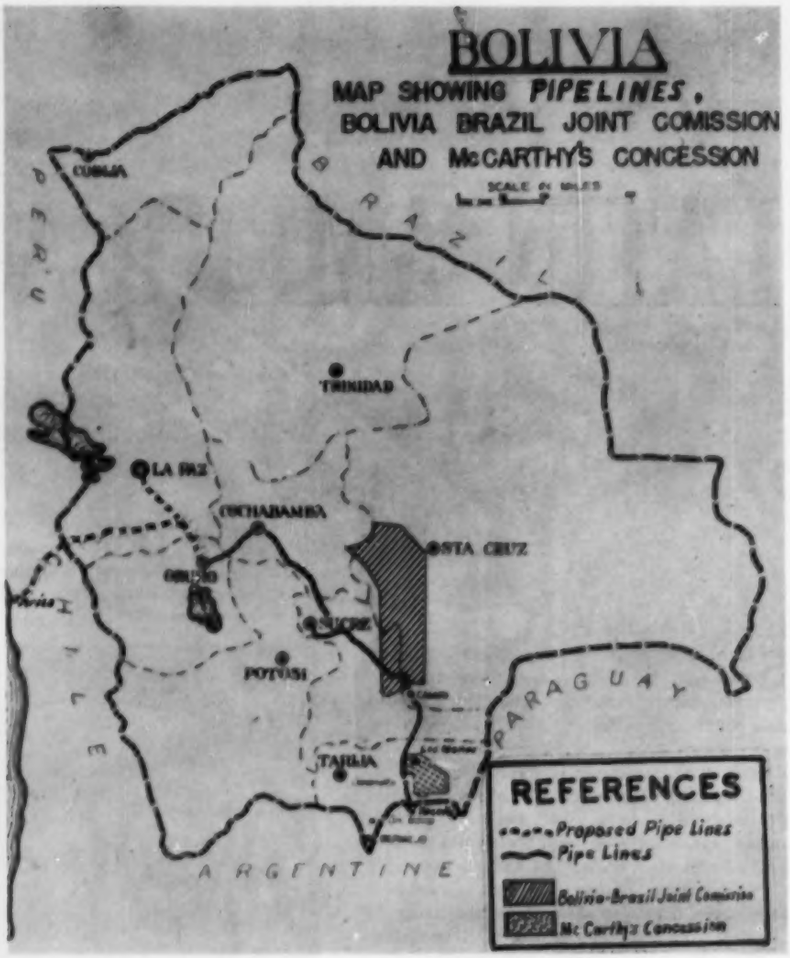
Total refining runs in Venezuela were about 23.4 percent of Venezuelan production during 1954, with a crude throughput capacity of 483,515 barrels daily at the end of the year.

Colombia—Total production in Colombia increased slightly in 1954 to 109,537 b/d. In the first six months of 1955 it declined to between 102,000 and 107,000 b/d. During 1954 Shell's Casabe field in the Magdalena Valley was the biggest producer, as in 1953, with 41,391 b/d.

Above, McCarthy's well No. 3 on the Monos anticline.

Below, new discovery well in Guairuy.

Below, seismic exploration on the Marañon river in Peru's Amazon basin. Texas Petroleum Co. photo.



Output by Empresa Colombiana and the former De Mares concession decreased by about 8.6 percent to 31,799 b/d, followed by Colombian Petroleum Co. of Socony-Texas with a yield of 26,385 b/d. San Pablo, an extension of the Cangallo field of Shell-Condor, came into production for the first time with 44 b/d.

The production of Texas Petroleum Company's Velasquez field in the upper Magdalena, which amounted to 4,109 b/d in 1954, will be increased to 25,000-30,000 b/d on completion of the 120-mile pipe line to Galan which will provide a pipe line outlet to the Atlantic coast.

The general development was not essentially modified by some minor discoveries of Texas Petroleum Co. north of its Velasquez field and two findings of Intercol in the Totumal area. Totumal and Agua Chica fields of Intercol yielded a total last year of about 160,000 barrels.

Exploratory interest in the Pacific coast belt, which received a setback in the northern part by Richmond's 15,538-foot dry well at Buchado in the Choco department completed in July 1954, will be renewed by a wildcat of Socony and Richmond in the southern zone near Tumaco. The sedimentary thickness of the Oligocene to Miocene deposits, which in the southern part reaches some 15,000 feet, offers strong incentive for exploration. Eocene deposits are exposed in the northern part in the San Juan-Atrato area.

On the Caribbean coast, International is drilling a wildcat near Barranquilla which passed 6,000 feet in July. In the Floresanto concession in the Sinu river area, which has been taken up by A. Guiberson of Texas, drilling will be started shortly.

The inauguration in August 1954 of the new Barranca Bermeja refinery with a throughput of 35,000 b/d facilitated distribution in central Colombia and helped supply total demand in Colombia of 34,794 b/d in 1954. Plans for the construction of a 25,000 b/d refinery by International Petroleum Co. at Cartagena have been completed. The new gasoline plant at Tibu in the Barco concession contributed 359,174 barrels of natural gasoline to the total 1954 Colombian yield of condensate of 1,107,017 barrels.

The pipe line system, which already con-

nects the Barranca refinery with Bogotá and Medellin and the producing Magdalena fields (except Velasquez and the Barco concession) with the Atlantic coast terminals at Mamonal and Coveñas, will be enlarged by a products line, 70 miles long, from Cali to Buenaventura on the Pacific Coast. The export value of crude amounted to almost U.S. $76 million in 1954, but imports of oil products are still about U.S. $21 million.

Legislation of March 11, 1955 granted depletion allowances to the petroleum industry ranging from 10 percent of gross to 35 percent of net income and higher rates in the less accessible eastern plains. Additional deductions were authorized to reimburse exploratory costs. The effects of this legislation on Colombian possibilities will be analyzed in the October issue of WORLD PETROLEUM.

Brazil—The outstanding development was the oil strike in March 1955 at Nova Olinda on the Madeira river, about 93 miles southeast of Manaos. From a depth of 8,915 to 9,000 feet a production of 250 b/d was obtained of about 40° API crude from sandstone of the carboniferous period.

While the Bahia basin is limited in extension by faults against the enclosing crystalline rocks, and sedimentary thickness and marine development in the Piauhy-Maranhao basin in the north and the Parana basin in the south are reduced and prospects poor according to drilling results there, the Amazon trough offers the principal prospect for Brazil of a larger sedimentary basin and commercial oil accumulation.

The Nova Olinda well is now being prepared for final testing, the necessary equipment having arrived from Venezuela and Trinidad. The other Amazon wildcat, now drilling at Alter do Chao in the municipality of Santarem, had reached 9,525 feet at the beginning of August. Conditions are similar to those of the Nova Olinda well.

Eight new rigs are scheduled to arrive from the United States shortly, bringing to 26 the total of rigs available in Brazil. Of the 18 rigs available now, 14 are at work in the Reconcavo fields in Bahia where seven new wells were completed in May, two each at Agua Grande D. Joao and Mata de Sao Joao and one at Candeias. The Candeias and one of the Mata de Sao Joao wells were dry, while one at Agua Grande was reported to have brought in gas and a little oil.

Of the remaining rigs, two are at work in Amazonas: one in Maranham and one in Parana. So far, exploration on the Atlantic coast in the comparatively narrow marine Cretaceous ingression belts has not met with success.

Production in Brazil during 1954 was 8.3 percent over 1953 and totaled 2,600 b/d, all from the Reconcavo fields in Bahia. Only five of the ten fields are producing, pending completion in February 1956 of the pipe line connecting the Catu-Mata-Candeias zone to the Mataripe refinery. The three principal fields in Bahia had boosted production during the first half of 1955 to about 5,125 b/d of which Candeias, with 54 wells, contributed 2,872; D. Joao, with 43 wells, contributed 2,130; and Paramirim's two producers contributed 61 b/d each. Colonel Levy, head of Petrobras, the government monopoly, stated that output of the Bahia fields will be trebled from present levels when the capacity of the Mataripe refinery is increased and the pipe line complete.

Production from one of the fields, Agua Grande, has been held down by repairs following a fire on July 6, when, while carrying out operations to control gas escaping around the lining, sparks from a motor set fire to well AG-13. Seven persons were injured, one fatally, and the tower collapsed. Two experts were flown in from Houston. They arrived Saturday night and had the fire under control the following morning.

Argentina—Crude output for 1954 is estimated at 81,300 b/d, a slight increase over the former year. In 1955, output has been reported up 10.7 percent to 90,000 b/d. The increase seems partly due to the development of new pools in the Neuquen area, where wells from around 5,500 feet depth yielded over 1,500 b/d from the upper Jurassic horizons. The most promising prospects are found around the Madrejones area in the continuation of the Campo Duran field in northernmost Argentina near the Bolivian boundary, where the Tupambi sandstones of the lower Gondwana formation have been proved oil bearing on a large anticline with a reported yield of up to several thousand b/d from around 13,000 feet depth. Commercial development is held up pending the construction of an 800-mile pipe line to Rosario on the Parana river.

A significant development was the signature of the Standard Oil Company of California-Argentine Government contract for the development of 12,355,000 acres in the basin south of the Santa Cruz massif located in the extreme southern area of Argentina. The terms of the contract call for a 50 percent share of the Government following amortization of the minimum investment of $13.5 million and gradual reduction to one-tenth of the area involved.

Approval of the contract by the Argentine Congress was held up by the revolution in June 1955, but at the beginning of August, President Peron had expressed his determination to push the contract through in its present form, despite outspoken opposition. Standard Oil Company of New Jersey was reported to have submitted a similar offer for a minimum investment of $12.6 million covering 11,230 square miles in the Neuquen area. The contract offered by the company is reportedly for 40 years duration, extendable for five years more.

Uruguay—Geological surveys have been carried out for several years by the firm of De Golyer & McNaughton. The government has contracted drilling of six wildcats with Dunlap & Graham of Long Beach, Calif. The first well is located west of Montevideo, where oil shows were reportedly found in a water well.

Ecuador—Oil output on the Santa Elena peninsula increased about three percent during 1954 to 8,400 b/d, 80 percent of the total being produced, as previously, by Anglo Ecuadorian Oilfields, subsidiary of Lobitos Oilfields Ltd. of London. Its 1,195 producing wells yielded about 5.6 b/d per well, or around 6,692 b/d in total. The American Manabi Exploration Co., second producer with 1,057 b/d from 147 producing wells, is reported to have sold a 50.5 percent share to Pantepec Oil Co. of Venezuela for $2.3 million. Standard of California is carrying out exploration on its concession block in the northern coastal area.

Peru—Crude production in 1954 amounted to 46,700 b/d, an increase of seven percent over 1953. The increase was due mostly to a rise of about 20 percent in the Lobitos field to 15,500 b/d, while other fields remained about the same with International's Brea-Parinas field producing 28,719 b/d in 1954.

Total output of natural gasoline was 1,060,089 barrels plus 58,473 barrels of liquefied gas for a daily total of 3,064 barrels. In 1955, production was about the same at 51,000 to 52,000 b/d, including condensate.

In the Montana region, the Ganso Azul company drilled five new wells for increasing production to sell to the new 5,000 b/d refinery at Manaos which will be completed in early 1956. The discovery of commercial production in Brazil's new Nova Olinda well could reduce this outlet, however, and hold production down to the approximately 650 b/d of the market in the Montana region.

Exploratory interest continues high. Outside of the proper Sechura basin, Petrolera Peruana struck two producers in its Mirador concession near the coast with about 500 and 250 b/d each, located on the southern extension of International's Portacuelo pool, the most southern of its Brea-Parinas field, and near its boundary.

In the northern part of the coastal area, Peruvian Pacific Petroleum Co., subsidiary of Cities Service and Richfield Oil Corp., has completed six wildcats to depths varying from 5,126 to 6,822 feet in the Tablazo concessions, located east of the Lobitos Co. concessions. In the last well, Tablazo 4-1, located 12 miles east of El Alto field of Lobitos Co., oil was found at 5,891 feet in the coastal conglomerates of the lower Eocene Salinas formation, yielding 760 b/d of 30° API crude on test.

Petrolera Amotape is preparing to drill a very attractive site on its concessions over the coast north of Lobitos Co. Douglas Oil Co. has drilled five inclined offshore wells and spudded the sixth. The first well brought in around 30 b/d and considerable gas, the third brought in about 90 b/d and the last about 125 b/d with one shut in and one dry.

Drilling is reportedly planned in southern Peru in the Pisco region, 150 miles south of Lima, where a reduced sequence of Eocene shales and thicker Miocene dia-

(Continued on page 114)

A member of a Shell seismic crew in the Burnt Timber Area of northern Alberta adjusts propane gas valve to engine heater. Cooling liquid from the engine passes through this coil-type propane heater so that trucks will start in the sub-zero temperatures of the north country. Tarpaulin skirt covering the engine holds the heat in. Engines will start, using this method, at −60° F.

CANADIAN PRODUCTION UP 35 PERCENT

By Leslie Orr Rowland*

PROMISE of long-range growth, far beyond anything that could have been visualized by the most graphic imagination a few years ago, is contained in the achievements of the Canadian oil industry in the first half of 1955, while at the same time the fundamental weak points of its phenomenal development have become subsidiary to the strength of the nation-wide oil economy.

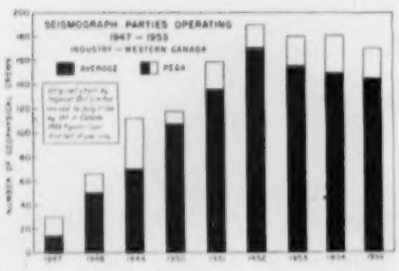
Phase by phase, the industry this year became even more mature than in any similar period since the Leduc discovery of 1947 plastered "Western Canada" in glowing letters on the world's oil map. The broad economic lines of the movement of crude oil and refined products were clearly defined, with the projection of future growth more nearly predictable by quantities and areas than it had ever been before.

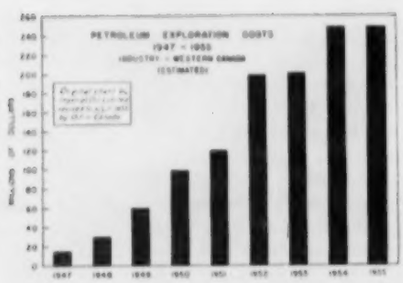
The exploration side of the industry experienced a continuation of the steady but slow decline which has featured geophysical work in the past two or three years. In Canada this decline was noticeable because of its sharp contrast with the tremendous expansion since 1947, engendered by the necessity of covering a vast amount of virgin territory in the shortest possible time to meet reservation and lease commitments. In the first half of 1955 it was apparent that a seasonal pattern had become established, due largely to the push of land acquisitions into the far northern regions as available acreage in more accessible parts of the prairies became exhausted.

This seasonal pattern is portrayed by the movement of geophysical crews into northern muskeg areas in large numbers around the end of the year, after the soft muskegs and open lakes are frozen over and can stand the weight of vehicles that would bog down or sink in them at any other time of the year. An intensive exploratory working period of three or four months at the outside is ended by the spring break-up of ice, and as this usually coincides with the incidence of road bans in more southerly areas, the withdrawal of crews from the north and their immobility in the south combine to reduce geophysical activity to as little as half of its winter peak during April and May.

General opinion of geophysical companies on 1955 operations is that nothing is in sight to mitigate this seasonal factor which this year cut active crews numbering 170 in February to 118 in April and a very modest bulge to 128 at the end of June. Although no reliable estimate of crew months worked in the first half was available at the end of June, it would appear from the number of crews at work at monthly intervals, compared with the number at the same points in 1954, that total crew months would be down some 60 or 70 for the half year, or a decline of eight to ten percent for all of 1955.

Despite the drop in average number of crews at work, the increase in operations in the far north and in the foothills of southwestern Alberta, where costs range from double to three or four times the cost of maintaining a party on the plains, indicated that the rate of capital expenditure on primary phases of exploration, wildcat and development drilling would again run to more than one million dollars per day, and would aggregate some $400 million for the full year. It was significant that the great bulk of Alberta Government Crown exploration reservations issued during the first six months of 1955 were for acreage in regions north of the Peace River area, while on the British Columbia side of the same northern region there was a tremendous increase in geophysical operations





* Editor, *Oil in Canada.*

in first six months

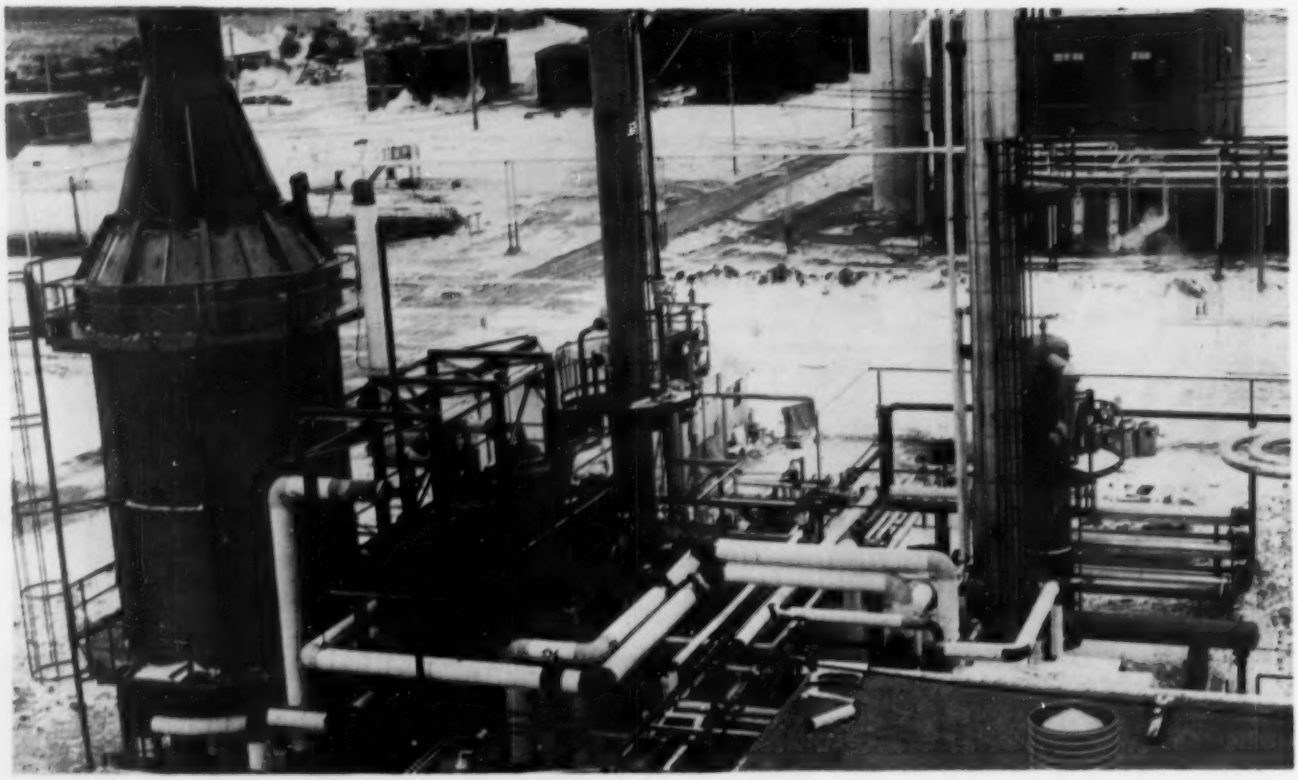
Drilling Shell-Home Sarcee #1. This well, a joint venture with Home Oil Company, was drilled in the Sarcee district, just south and west of the City of Calgary.

with eight seismic crews working out of Dawson Creek at the end of June.

The drilling industry made a remarkable recovery, in the first half of 1955, from the severe depression which had affected its operations for a year and a half previously. The shaking-out of several financially weak contractors and the withdrawal from Canada of several American drilling contractors in 1954 had a beneficial effect on those remaining, while the greater average depth of both wildcat and development wells, as the wildcat play moved north and the relatively deep Pembina field came into its most intensive development stage, promoted greater continuity of operations and longer time between moves. The average time of a rig on a Pembina field well, for example, is around 28 days, and as many as 50 rigs have been employed at one time in the development of this major Cardium sand reserve which has been estimated to have as many as 4,000 drillable well sites.

From an inactive status that affected as many as 30 percent of all available rigs in Alberta in the middle of 1954, drilling activity across the four western provinces reached a high of 253 rigs at work at the end of June, equal to the highest point of activity in the past three years in May 1952. The changing regional distribution of drilling activity was conspicuous in the fact that while Alberta rigs numbered 174, or 15 percent fewer than in the 1952 count, rigs in Saskatchewan had gone up nearly 70 percent from 31 to 51 and those in Manitoba had increased by more than 200 percent from six to 19. The Saskatchewan rig count represented a new record, while Manitoba's was only one short of the peak set last fall when the completion rate exceeded 30 wells each month.

The trend of larger units of operation in contract drilling, arising out of the lean times of the past two years, was apparent from the fact that 100 rigs, or 40 percent of



New catalytic reforming unit at British American Oil's Calgary refinery.

the total, were operated by only seven contractors out of the 64 operating in western Canada.

The increase in rig utilization was directly attributable to a substantial increase in wells which finished drilling in all four western provinces. The six months' total of 1,135 wells was up 22½ percent over the 926 completions of the first half of 1954. The total of 4,875,849 feet of hole drilled was up 15 percent over the 4,272,498 feet drilled in the first half of 1954.

Development drilling led the way in all provinces, with wildcats lagging. Alberta's completions of 478 wells against 380 last year were up 25 percent, Saskatchewan's 268 were up 60 percent over 168 in 1954, and Manitoba's 126 were 67 percent over the 1954 half-year total of 76. In wildcats the over-all trend was considerably down, with Alberta sustaining the best completion rate of 138, compared to 137 last year, while Saskatchewan slumped to 79 from 138 and Manitoba to 20 from 27. The British Columbia and Northwest Territories total was 24 against eight last year, due to intensified exploratory efforts following the possibility of natural gas export being permitted. Development wells altogether numbered 874 against only 624 in first half 1954. The Western Canadian wildcat total was 261 against an impressive 302 last year.

The indicated discovery ratio was very high in comparison with the long term international average, amounting to 43 indicated oil wells and 20 gas wells, or one success for every four completed wildcats. This apparent ratio will probably be reduced somewhat as further evaluation of some of the indicated discoveries inevitably will result in abandonment. There were no indicated discoveries in the first half which could be described as major fields in any of the provinces.

Major long-term trends which probably reduced the attractiveness of increased wildcat activity were mainly those involved in the future of crude oil producibility in relation to available markets within economic range. A carefully detailed and well-supported forecast was presented in May, at a professional meeting, by Fred G. Cottle, manager of the transportation and supply department of Imperial Oil Ltd., which indicated the strong probability of a continuing excess of producibility until at least 1960. Mr. Cottle, who dealt exclusively with markets, predicted the growth of the Prairie demand for crude oil from 123,000 b/d this year to 154,000 b/d in 1960. Eastern Canada, he thought, would grow from 107,000 to 187,000 b/d, while British Columbia, including export movement by pipe line to the Pacific Northwest states, would rise from 83,000 to 173,000 b/d. The Lakehead area, he forecast, would rise from present exports of 22,000 b/d to 59,000 b/d by 1960. The sum of all these regional markets which appear to be in sight is 473,000 b/d, against current markets which total 335,000 b/d.

Correlative to this analysis, an address delivered earlier (in the middle of February) to another professional audience, by executive vice president W. O. Twaits of Imperial, projected the producibility of Western Canadian crude reserves to 1960 and found, in the most optimistic possible appraisal of future markets, that 550,000 b/d of Canadian oil might find an outlet through domestic utilization and export channels, but at the indicated rate of growth of proven reserves this would leave an unallocated producibility rate of 400,000 b/d or more. The million-barrel-a-day potential production rate within the next five years, which no Canadian operator doubts will be attained at the current rate of development of proven fields and even a normal discovery rate predicated on the average of the past eight years since Leduc, will have a dampening effect on wildcat drilling for a long time to come.

These long range forecasts, however, have a beneficial influence on the Canadian oil industry's outlook, which was evident to a marked degree in operations during the first half of 1955. From the optimism which a few years ago produced leasing prices that could not be supported financially in a period of tightening production proration, has emerged a sound appraisal of all the

many factors, both domestic and international, which affect the future production and marketing of Canadian crude. In the current year's first half there was apparent a desire by operators to avoid over-development of proven field areas by adoption of wide spacing patterns, running in most cases to 80 acres per well site in place of the traditional 40 and in several cases of 160 acres. The bidding of cash bonuses on Crown reserve sales sagged to prices which reflected a realization of longer payout periods under reduced allowables. For example, the average price for cash bonus on purchase of lease of a proven quarter section of Pembina Crown reserve rights dropped in January and June this year to around $250,000 from a high average of $400,000 in sales a year ago.

There was evident in the first half operations, outside of fields where heavy offset obligations compelled rapid drilling out as in the case of Pembina, a tendency toward delineation drilling on wide spacing patterns for the purpose of proving up large areas rather than developing intensively and thereby reducing the production allowable per well.

Conversely, one very lucrative return came to the Alberta Government from the purchase of a Crown exploration permit on a four-township block west of the Pembina field by The California Standard Co. in June for a cash bonus of $10,500,002. The net leasable portion of 46,080 acres which the company may retain as a maximum Crown lease if it wishes to convert, and out of which it must select its lease if it makes a discovery, would have to provide discovery of the equivalent of one major field of at least 100,000,000 barrels to justify the cost, plus the exploratory drilling which will have to be done for evaluation. It was significant, however, that in the 1955 first half, the bulk of bidding on Crown reserve parcels of this category was done by major companies which can afford to wait a long time for net returns.

Despite the future limitations on marketing of Canadian crude, the current year is going to be another record-breaker for total oil production, judging by the first half estimated figures, based on available provincial government returns at the end of July and extrapolated to the end of the first half. These figures show a first half total of 56,572,400 barrels for the Prairie provinces, which account for nearly all Canadian production, up 35 percent from the 1954 first half total of 41,825,936 barrels.

The second half should see production averaging better than 350,000 b/d for an additional 63 million barrels which, together with Eastern Canadian production of less than one million barrels, should make the 1955 total more than 120 million, up 25 percent over last year's 95.6 million barrels.

The important contributing factors which have come into operation this year are the conversion of the British Columbia refineries exclusively to Canadian crude, the same conversion at the Trinidad Leaseholds Ltd. refinery in Port Credit, Ontario, and the increase in export markets with the going on stream of the General Petroleum Corp. Ferndale refinery last fall, the Shell Oil Co. Anacortes refinery this summer and the Great Northern Oil Co. St. Paul refinery in June. The St. Paul refinery opening marked a vital point of progress in the marketing of Saskatchewan medium gravity crude which is not acceptable to most Canadian refineries. Its capacity of 25,000 b/d is expected to be largely taken up by the end of the year and at mid-year it was calculated that it would add an average of 20,000 b/d to Saskatchewan production in the second half, or exactly double the entire production of the province in the first quarter.

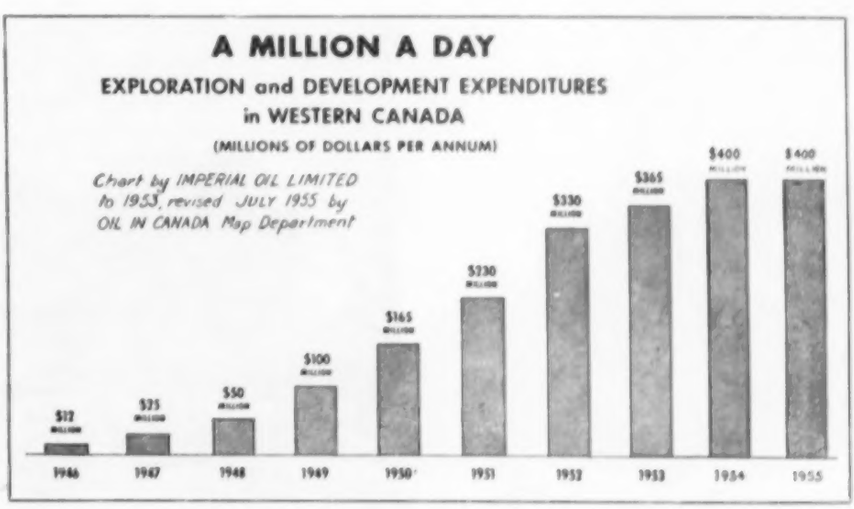
A high proportion of Canadian crude continued to move by trunk pipe lines in the first half. The Trans Mountain line to the west coast carried a daily estimated average of 77,000 b/d, a large increase over the 39,787 b/d transported in the full year 1954. Throughput for the second half started strongly with 101,000 b/d estimated for July, according to refiners' nominations. The Interprovincial system carried an average of more than 150,000 b/d, between Edmonton and points along the line to Sarnia, compared to a little less than 150,000 b/d for the whole of 1954 and only 139,000 in the first half of 1954.

The volume of pipe line construction in the first half of 1955 was negligible and the entire year was expected to be very light with only two major projects assured. The Peace River Oil Pipe Line Co. Ltd. crude oil line was under construction, 106 miles of 12- and 16-inch from the Sturgeon Lake oil fields of northwestern Alberta to the Trans Mountain line west of Edson. In Saskatchewan, Saskatchewan Power Corp. had 235 miles of trunk gas line loop and extensions under construction, 12- and 14-inch, between the Brock-Coleville fields and Saskatoon-Prince Albert.

The first half of 1955 found the main channels of oil transportation completed with the two major pipe lines running east and west from Alberta, and this extended dual system is calculated to be capable of handling all crude oil movement required for the next five years or more, with the addition of only some intermediate looping of the Interprovincial line.

A major disappointment of the first half was the complete failure of negotiations for permission to Trans-Canada Pipe Lines Ltd. to build its projected natural gas pipe line east from Alberta. Owing to the uneconomic nature of the all-Canadian routing to Eastern Canada insisted on by the Dominion Government, the company was unable to secure financing. An alternative plan submitted in conjunction with Tennessee Gas Transmission Co. in May, by which Trans-Canada would build a 30-inch line as far as the international boundary south of Winnipeg where it would deliver a guaranteed volume of 500 mmcf/day to a new line which Tennessee Gas would lay east to the Ohio-Pennsylvania boundary to connect with its existing system, and under which it would undertake to deliver up to an equivalent volume to Toronto and other eastern Canadian cities, was still under study at the end of July, with no indication whether the Canadian federal government would be willing to accept it as an economic and financeable solution.

At the same time, the plan of Westcoast Transmission Co. Ltd. to lay a 30-inch line for natural gas a distance of 650 miles from the Peace River area to the international boundary east of Vancouver B.C., was awaiting hearing before the Federal Power Commission in Washington, D. C. on the collateral application of Pacific Northwest Pipeline Corp. and El Paso Natural Gas Co. for permission to import up to 400 mmcf/day from this line. There was some hope that construction might commence late in the fall if the FPC were to deliver a speedy decision in favor of the plan.



Eastern Hemisphere field operations at normal level

OPERATIONS in the Eastern Hemisphere have been normal during the first half of the year. Widespread reconnaissance work has been in progress in a number of countries and drilling has not been unusual.

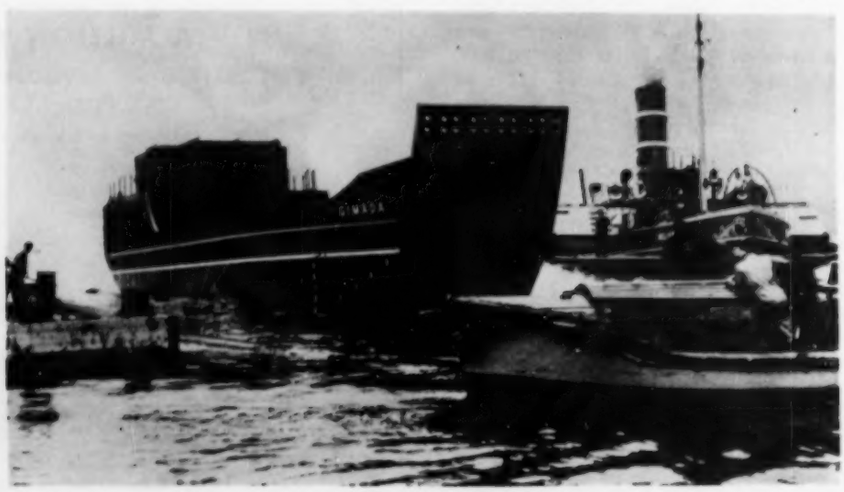
Although productive capacity has been ample in the Middle East to meet market demands, there has been the usual amount of geological and geophysical activity and rigs on hand have been regularly employed.

In its recent report to the Saudi Arab government, Arabian American Oil Co. stated that it had employed nine parties in a diligent program of surface mapping and in geological, seismic, gravity, magnetic and structure drilling activities. The groups worked in all parts of the nation from the extreme northwest near the border of Iraq to the southern portions of the Rub al-Khali. Deep stratigraphic tests were sunk to increase knowledge of the country. One such was drilled to 11,864 feet.

In the first half of this year four development wells were completed, two in Abqaiq, one in Safaniya and one in the Uthmaniyah area of the Ghawar field. The five areas in this field now are considered part of one great field 130 miles long and 12 miles wide, on the average.

On June 30 there were 242 wells in the seven proven fields in Saudi Arabia. Of these, 144 in four fields were being produced. Plans have been made to open the offshore field in the Persian Gulf at Safaniya to commercial production. There are 17 wells in this field of which 16 are available for production and one maintained as

Three specially-designed landing craft have been built by Australasian Petroleum Co. Pty. Ltd. to aid exploratory work in Papua where a search for oil has been in progress for the past ten years. The "Gimada," pictured here, can carry 120 tons of field equipment. Vessels are 110 feet long with a breadth of 26 feet.



A camel caravan pauses on the Western Desert of Egypt some 50 miles southwest of Alexandria to watch wildcat drilling operations of the Egyptian-American Oil Co., subsidiary of Continental Oil. The company's first well in Egypt will drill to 15,000 feet if necessary on a 50-million-acre concession.

an observation well for technical studies.

The company is planning a detailed study of reservoir conditions in the Ghawar field and in the Arab-D reservoirs at Abqaiq, Dammam and Qatif. Electric field analysis is to be made in a specially constructed model at a research laboratory. Water and gas injection studies are being made to insure maximum ultimate recovery.

Kuwait Oil Co. has been producing more than a million barrels daily during the first half of the current year. At the end of the year 169 wells were capable of production and 160 connected to flow lines. The producing area still is officially classed as being divided into three fields—Burgan, Magwa and Ahmadi—although it is thought that step-out drilling eventually will prove all to be part of a single reservoir. The company has been operating three rigs in the fields and one wildcat operation on the northern border not far from the Rumaila field in Iraq. Seismic studies are being conducted in other parts of the country.

In southern Iraq the Rumaila field, discovered in 1953, has recently been opened to commercial production following expansion of pipe line outlet to Fao at the head of the Persian Gulf. The Rumaila field is producing from the Middle Cretaceous at 10,000 to 11,000 feet, the same formation which is productive in Zubair some 20 miles to the east. At the end of 1954 five wells had been completed in the field and three others were drilling. A 12-inch line has been laid to connect with the new 24-inch line from Zubair to Fao.

Basrah Petroleum Co. has completed 38 wells at Zubair and two fields are scheduled to produce about 166,000 b/d by the

Gathering lines in Iran often must traverse rough terrain to connect with main pipe lines. Pictured is the production line from a well in the Haft Kel field.

end of this year. Output during the first six months averaged 140,700 b/d.

Two new degassing stations were built, one near Hammar Lake, and the other in the Rumaila field.

At Fao, four more new storage tanks were built, and ten were in course of construction. A third jetty was completed, and at the end of the year, a fourth was almost completed.

Early in November, six of the storage tanks were set on fire by lightning, but the fires were successfully extinguished by the company's personnel, assisted by the local authorities, within three hours.

Iraq developments during 1954 have been summarized recently by Managing Director H. S. Gibson, who reported that "the high level of production from Kirkuk, the high rate of pressure decline at Zubair, and the still more serious production difficulties at Ain Zalah and Butmah, make it urgently necessary to discover new reserves to supplement these producing fields, and in 1954 the exploratory efforts of the three companies were intensified.

"In the I.P.C. concession these efforts have been crowned with success at Jambur and Bai Hassan, and in the Basrah concession by the discovery of the Rumaila field. Unfortunately, in the Mosul concession, where over 100 test wells have been drilled, no structure comparable with the producing fields of central and southern Iraq has yet been found; but the search, using all the resources of geology and geophysics, and an intensive program of drilling is being vigorously pursued."

The Jambur field is located 35 miles southeast of Kirkuk, and the discovery well was drilled in 1954 finding oil at a depth of 5,800 feet. At the end of 1954 three wells had been drilled and a fourth was drilling, the prospects for good production appearing very promising.

Buildings for the drilling camp were removed from the temporarily abandoned Kor Mor site and 21 miles of new access roads were laid through difficult country.

Oil was discovered in the Bai Hassan field, which lies 20 miles northwest of Kirkuk, in 1953. Well No. 1 was never completed; Well No. 2 had only gas and was abandoned in 1947. Well No. 3 found oil, Well No. 4 was completed in 1954 and at the end of that year Well No. 5 was drilling.

In Iran, efforts of the consortium have been directed toward an orderly return of Persian oil to world markets. The November issue will include a report on the condition in which producing fields were found by the team of western experts. The refinery at Abadan was well maintained and is being brought back to normal operations, although at a reduced rate. The program calls for processing of 200,000 b/d of crude at the end of the year. Average crude output during the first half was 291,000 b/d and this will rise during the last half sufficiently to bring the year's average to about 350,000 b/d.

Production from Qatar was up ten percent in the first half year to about 110,000 b/d. New pipe line facilities have been installed to facilitate crude handling and tankage has been enlarged. Last year four new wells were drilled.

Cities Service has begun active drilling operations in the Dhofar province of the Sultanate of Muscat and Oman on the southern coast of Arabia. Site of operations is north of the coastal range some 35 miles inland, requiring a major road and camp construction job. First effort was to find water in the desert. In this the company was successful, finding ample supplies of water in the first well drilled for this purpose. Location for the first test well drilled for oil was made several months ago and drilling got under way about June 30.

In Egypt the first discovery since 1948 was made early in the year by International Egyptian Oil Co. at Belayim on the Sinai peninsula. The well was rated at 1,150 b/d on preliminary tests at 7,350 feet and then shut down pending completion of a pipe line to Feiran. Previously drilled wildcats in the same area by this company were failures.

Except in Ras Gharib no recent drilling has been done in older Egyptian fields and production has been declining steadily. At Ras Gharib, Anglo-Egyptian Oilfields Ltd. drilled five wells in the last half of 1954 and early in the year had one rig running. The field is now the largest in Egypt, producing more than 20,000 b/d from 106 wells in various formations found at 1,200 to 2,500 feet.

Egyptian-American Oil Co., a subsidiary of Continental Oil Co., is drilling a deep test well 28 miles southwest of Alexandria on the 50-million-acre concession granted to a group of American oil companies early last year. Originally granted to Conorada Petroleum Corp., the concession has been assigned to the subsidiaries of Continental Oil Co., Cities Service Co., Ohio Oil Co. and Richfield Oil Corp. Egyptian-American is the operator for the group.

Conoco, Cities Service, Ohio and Richfield recently added acreage to its original concession in Egypt by acquiring a concession on 10 million adjoining acres extending from the eastern border of the original concession east to the Nile River. With this added acreage, the group has a concession on the entire part of the Western Desert lying between the Nile River and the Lybian border, and north of the twenty-eighth parallel.

In the first concession, Conoco and Ohio each own 27½ percent and Cities Service and Richfield 22½ percent. In the additional 10-million-acre concession, the percentages are reversed.

The exploration program which is being carried out during the first year of the concession is both extensive and intensive, according to Millard K. Neptune, general manager of Egyptian-American. Aerial photographs are being taken of the entire concession by Fairchild Aerial Survey, Inc.,

Los Angeles, and Aero Service Corp. of Philadelphia. Four surface geological parties, all operated by Egyptian-American Oil Co., are in the field.

A gravity meter party, using four gravity meters and photographic transits, has been supplied by the Robert H. Ray Co. of Houston. Robert H. Ray Co. and Seismograph Service Corp., Tulsa, are furnishing seismograph parties for the desert operation. An offshore seismograph survey along the entire coast of the western desert, from Alexandria to Seloum, has been completed by Geomarine Service, Inc., Dallas.

A seismograph party and four company-operated surface geology parties will be added to the organization this year. Also there will be additional men added to the staff to help clear land mines, planted in the desert during World War II, in advance of the exploration crews.

Except for the land mines, operations over most of the area are not difficult, particularly north of the Qattara Depression. The climate is moderate and the ground surface is substantially flat and not sandy.

Besides Mr. Neptune, other members of the operating staff of Egyptian American Oil Co. are: James S. Royds, exploration manager; William F. Penniman, Jr., administrative manager; Samuel W. Leonard, controller; Don B. Eicher, chief geologist; Robert H. Bixby, chief geophysicist; Chance E. McDonald, chief of mine disposal; Bryan L. Denson, drilling superintendent; and Vernon Hand, superintendent for supplies and transportation.

Under the operating contract for the Egyptian concession, Conoco, Cities Service, Ohio and Richfield each have a representative to determine annual programs, subject to quarterly review and adjustment. Company representatives are: S. K. Clark, Continental; R. V. Whetsel, Cities Service; Fred J. Funk, Ohio Oil; and Rollin Eckis, Richfield.

Exploration work in Israel is described in a separate article elsewhere in this issue.

In Ethiopia the Sinclair Petroleum Co. has conducted extensive geological, seismograph, gravity-meter, magnetometer and geophoto surveys during the past few years and is now engaged in drilling a series of 3,000 to 4,000-foot exploratory wells primarily for stratigraphic determination. It has completed four such wells to date and is actively continuing the program.

In addition to the field surveys mentioned above, Sinclair also drilled two deep wildcat wells, neither of which was productive.

Further exploratory work in Africa is spread in the Algerian desert and other widely scattered portions of the continent. Shell has been hunting oil in Nigeria for the past 16 years and is still at it with a modern rig in the jungle at Oloibiri.

In southern Asia the sedimentary basins in the northern portion of the Indian subcontinent are coming in for a period of exploratory drilling. Stanvac is doing reconnaissance work in both east and west Pakistan and in India. In east Pakistan, where Stanvac has a 10,000-square-mile permit, a gravity party is working and a seismic crew will start early in 1956.

In west Pakistan, Stanvac has two permits, one covering 6,700 square miles and the other 3,200 square miles. An airborne survey of these permits is complete and two gravity parties and one seismic crew are working. Two or three geological parties are being formed for work in west Pakistan.

Gas pipe line construction work is continuing to prepare a market for Sui gas. Following the completion of the 348-mile, 16-inch natural gas line from Sui field to Karachi in the record time of 5½ months by Pakistan Constructors (the joint venture of D. & C. & Wm. Press Ltd. and the Morrison-Knudson Co. of Pakistan), this same company has been awarded the contract for the construction of the first section of 196 miles of a similar sized gas pipe line from the Sui gas field to run eventually to Lahore with branch lines to Kot Addu, Montgomery, Jhang and Maghiana, a total of 422 miles.

Work on the first section of the line from Sui to Multan, a length of 196 miles, will start in mid-1956, and the estimated time for completion is six to seven months, with an estimated total cost of $13.8 million, of which amount the cost of the actual laying will be about $3.2 million.

The terrain through which the pipe will be laid is very arid and particularly difficult, there being a total absence of rail and road communications, while in addition there is a major crossing of the River Indus estimated to be about five miles.

The second portion of the line from Multan to the terminus will be the subject of a further contract which has not yet been placed.

As in the case of the Sui-Karachi line, the consultant will be C. Stribling Snodgrass.

Stanvac has been studying a 10,000 square mile block in the West Bengal basin for several years. A magnetometer survey was conducted in 1951 and two gravity parties have been in the field for 18 months. Data is being reviewed to select a location for 1956 drilling.

In Assam and Tripure, geological work and general reconaissance work is in progress by Stanvac.

Assam Oil Co. recently has added to the potentialities of northeast Assam by a discovery at Nahorkatiya. This important new field is now linked to Digboi by a road and pipe line. Digboi, where oil first was produced 65 years ago, thus has a new lease on life.

Despite unsettled conditions in parts of Indonesia, the industry is continuing to develop its properties by making added investments in both producing and refining facilities. In central Sumatra Caltex is drilling a wildcat 40 miles northwest of the Minas field. Recent depth was 2,000 feet. Normal development drilling is being carried on in Minas. The field now contains 142 wells. A new geophysical party is being sent into the field to study other parts of the Caltex concession.

Shell interests still were not operating their properties in north Sumatra, on Ceram or in parts of Java. In the Rembang field in Java, Shell drilled 10 wells last year, of which nine were oil wells and one a gasser. The field produces 11,000 b/d. In south Sumatra, Shell drilled 49 wells last year of which only five were dry. Shell production in Sumatra was averaging 96,000 b/d at the close of the year.

Standard-Vacuum is conducting normal development and remedial work in Sumatra without much change in present production.

In Netherlands New Guinea, production was increased sharply last year by an active drilling campaign in the Mogoi field jointly owned by Shell and Stanvac. Eighteen wells were drilled, of which 14 were oil producers. Output at the end of 1954 was 7,400 b/d. Klamono continued its steady output of 4,000 b/d from 20 wells.

In Borneo's Seria field, Shell was operating five rigs at the end of 1954 and completing more than two new wells per month. At the end of the year 237 active wells were producing 97,000 b/d. No drilling activity has been in progress recently in the Miri field in Sarawak.

The search for oil in Australia and in Papua continues without significant result. Caltex has a second producer in western Australia and is continuing its search, as are other companies in various parts of the continent.

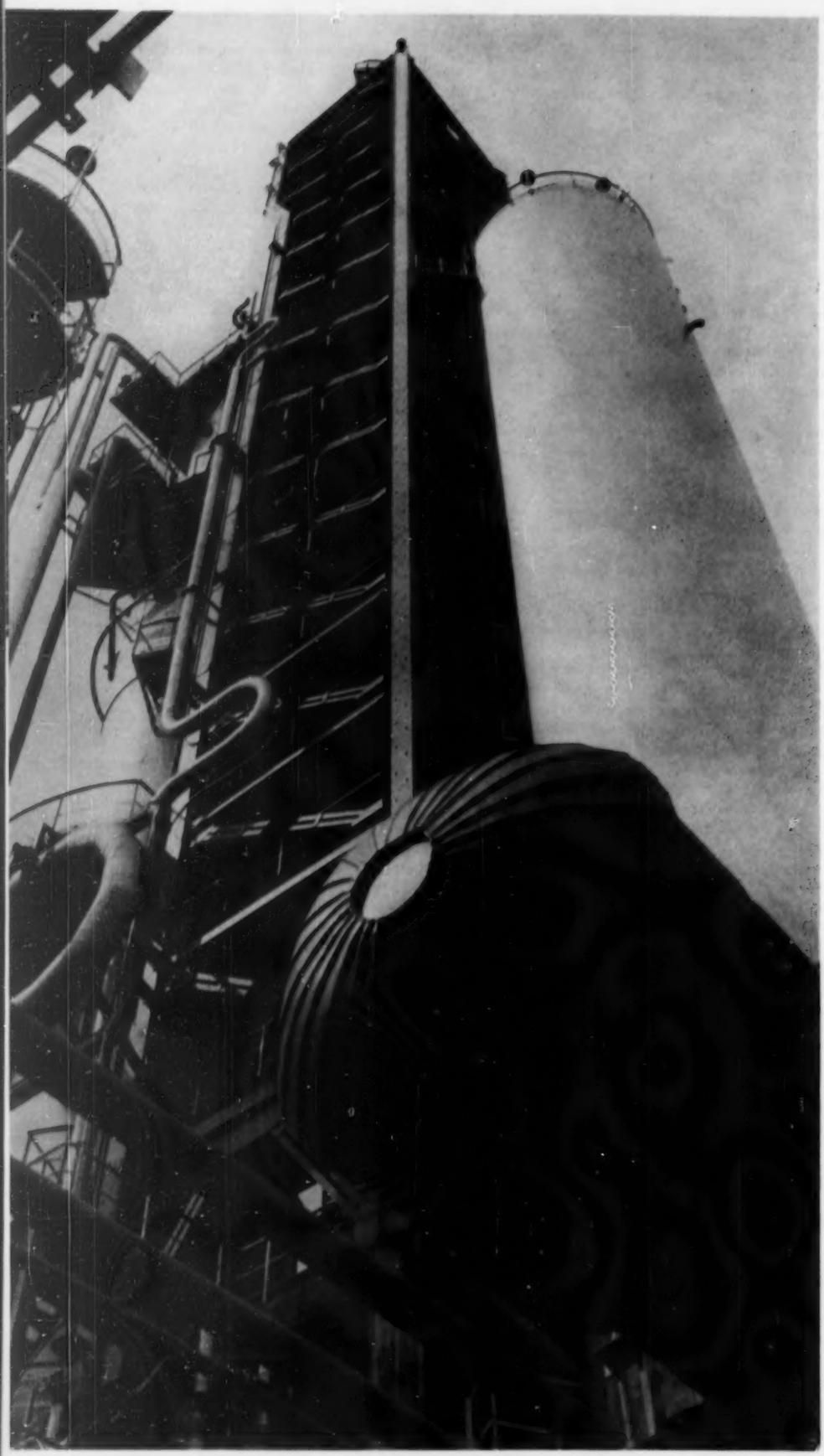
Frome Lakes Pty. Ltd. has begun drilling a few miles off the South Gippsland highway, approximately midway between Yarram and Sale, Victoria.

Frome Lakes Pty. Ltd. is owned by Lakes Oil Ltd., the pioneer company in the Gippsland area, and Frome Broken-Hill Co. Pty. Ltd., whose joint shareholders are D'Arcy Exploration Co. Ltd. (British Petroleum Co. Ltd.), Vacuum Oil Co. Pty. Ltd., Zinc Corporation Ltd., and Interstate Oil Ltd.

Westralian Oil Ltd. has begun a study of its permit area east of the Patterson Range and West of Lake Dora. Recent aerial reconnaissance will be followed by surface studies.

In Europe discoveries of 1954 in France and Sicily are being developed and both Parentis and Ragusa fields now are being produced commercially. A discovery on the Italian mainland early this year has added materially to the country's oil reserves. Detailed reports on French and German developments are to be found elsewhere in this issue.

Newest entry into Sicily is Standard Oil Co. (N.J.) which has formed a new company, Augusta Richerche Petrolifere, S.F.A., in conjunction with Siciliana Olii Minerali to prospect on three parcels totaling 215,000 acres. First test was spudded in on the Augusta tract on June 20 and drilling of a well on the Gioitto tract was begun at the end of June. There are no immediate plans for testing the Mascalucia acreage.



The new Yokkaichi refinery—catalyst, storage and heat extension units. Photo courtesy Daikyo Oil Co.

Government interest

By Stuart Griffin

GOVERNMENT seems decidedly to be moving into the Japanese oil industry picture, a trend started in 1954 that shows every indication of intensifying in 1955, and from now on.

Highlights of 1955 may well be the inauguration of a semi-governmental petroleum resources development company, chief agency for implementing the ambitious five-year domestic oil development program, and a start made on an intended five-year petrochemical industry development plan.

But sharp differences of opinion have arisen between two key Japanese Government agencies. The Ministry of International Trade and Industry (MITI), preparing to submit a bill to the National Diet for the oil development company's establishment, is at odds with the Finance Ministry.

The MITI wants one billion yen ($2.78 million) in Treasury investment to set up the company in the Japanese fiscal year 1955-56 (April 1, 1955 through March 31, 1956). MITI contends that to push its five year development plan to completion by fiscal 1960, such a firm must be set up. (Under the plan, there would be an annual increase of 1.9 million barrels in Japan's crude oil output, about 9.5 million more barrels in the five-year period).

The purpose of the new company: to prospect and develop domestic oil resources. And though it is being played down, the "reason behind the reason" as the Japanese say it, is to minimize the present continuing dominant influence of foreign oil firms in Japan's oil industry.

MITI wants the company established by September if possible, with an initial paid-up capital of 1,250 million yen ($3,472,222), the authorized capital to be increased finally to 10 billion yen ($27.78 million).

The company would pay no dividends for a fixed period, would be exempt from state and local taxes, and would be authorized to acquire new mining rights required for prospecting or to obtain prospecting rights. The Government would invest $2.78 million of the $3.47 million required, at first.

Altogether, the Government would invest, over a five-year period, about $18 million of the $27.78 million total. Private firms would invest $833,000 a year—$4,160,000 in five years.

But the Finance Ministry objects vig-

is intensified in JAPAN'S OIL INDUSTRY

orously; it is willing to appropriate only $277,777 for oil resource development in fiscal 1955-56. Officials maintain that even if crude oil annual output is boosted by 6.3 million barrels, this would only be enough to cover a mere 10 percent of Japan's yearly crude oil requirements.

The Finance Ministry argues that if Treasury funds must be disbursed in fiscal 1955 in like amount to fiscal 1954, the Government might just as well subsidize the existing major oil development company, the Teikoku (Imperial), to the same amount. Thus, they reason, what is the point of establishing the semi-government agency the MITI suggests?

MITI, however, insists on appropriation of a greater part, if not all, of the one million yen this fiscal year. It stresses that unless crude oil output is boosted by 6.3 million barrels annually, Japan's oil well drilling industry will always suffer losses and will never be independent of foreign firm domination, a thorn in the side of nationalist-resurgent Japan. And the Government would have to throw its funds into the industry for a prolonged period.

Even if indigenous crude output was boosted by only 10 percent, foreign firms' grip on Japan's oil industry would be lessened by that much.

The proposed oil resources development firm would contribute much towards economy of foreign exchange for imports and towards badly-needed employment gains. MITI argues also that so long as large amounts of Treasury investments are expected for the firm's establishment, operation of such funds should not be left to a single civilian company's discretion, without some large measure of Government control.

The Teikoku Company supports the project. This firm, producing 96.5 percent of Japan's total crude oil now, awaits substantial outlay of Treasury funds. It can then pursue its massive seven-prefecture oil drilling program.

Barring Finance Ministry approval, MITI may raise the required one billion yen for one year's activity by selling its 69 million share interest in Teikoku, and then urge private shareholding in the proposed company by Japan's "Big Nine" and the Daido Oil Company, a small oil development concern.

MITI will also announce in fiscal 1955-56 a five-year petrochemical industry development plan.

This calls for extending Japan Development Bank loans—600 million yen or $1.66 million this fiscal year—to such leading petrochemical concerns as Maruzen, Mitsubishi, Japan Petroleum, Koa, and Showa. By developing this industry, it hopes to keep a steady supply of benzol, phenol and acetone, raw materials for making nylon, cellulose acetate, phenol resin and methacrylic resin, and to bring about price-slashing of raw materials to international levels, by mass production.

MITI wishes Japan Development Bank loans extending to petrochemical firms. It will also allow induction of foreign techniques and importation of necessary equipment and take measures to cut corporate taxes and customs duty on equipment brought in.

Throughout the final six months of calendar year 1954, continuing through the first six months of 1955, the Japanese oil manufacturing industry has shown an increasing desire to expand. Pressure for expansion is clearly shown in a spate of investment in Japan's oil refining industry, not necessarily favored by Government, all-out efforts by Japanese firms to boost refined oil export sales, as well as the plan to establish the oil resources development enterprise mentioned before.

Competition for additional allocations of foreign currency for oil imports is keen between firms processing imported crude oil only and those chiefly concerned with refining oil Japan produces domestically.

Nippon Oil and two other refineries processing the domestic crude oil, located in Akita and Niigata prefectures in the areas along the Sea of Japan coast, have asked the Ministry of International Trade and Industry for more foreign currency for imported crude petroleum.

These companies maintain that their share has been smaller than the amount received by those companies which have been processing only the crude oil they bring in from abroad.

Allocations for the three Japan Sea coast companies have been restricted by the Japanese Government to 60 percent of their refining capacity while that for companies processing imported crude oil only was established some time ago at 80 percent of their refining capacity.

The three Japan Sea coast refineries, nevertheless, have been granted extra foreign currency allocations for 8,200 b/d of crude in return for their contributions to the improvement of domestic crude oil production.

Meanwhile, the three Pacific seaboard companies refining imported crude oil only are opposing the Japan Sea coast oil companies' request for increased foreign currency allocation.

Japan's "Big Nine" oil companies have invested about $83 million in refinery expansion and facilities improvement since mid-1951. They intend to invest an additional $54 million in the period just ahead. Of the $83 million, roughly 25 percent came from foreign capital investment; while of the proposed $54 million additional outlay, approximately 30 percent represents foreign investment, largely from the United States.

This plan to increase investment has drawn Government fire, some officials contending the investment already has been excessive and that future investment, particularly foreign, so soon is unnecessary. The firms have the funds, and they wish to spend them on expansion and improvement while the money is at hand. They believe they can nudge the Government into providing more foreign exchange allocations for boosted crude oil imports when plants are built.

Japanese oil product demand totals about 665.6 million barrels yearly, being met almost entirely through imported crude (97 percent) although domestic production is increasing. The target pin-pointed for the home industry is a 10 percent expansion of output, to be absorbed by Japan's growing merchant fleet, its industrial operations switched from coal to oil, and the enlarged requirements of the Self Defense Forces.

Without increases in foreign currency allocations, Japan can only import and produce enough to refine 130,000 b/d of domestic and imported crude oil, though its refinery capacity today stands at 218,000 b/d, more than four times the prewar capacity of 50,730 b/d. Present and planned gains would bring an additional increase of 27,000 b/d.

The Government is pondering steps to reduce such investment. Some sections of the Government are said to favor requiring oil firms to obtain permission before ex-

An air view of Idemitsu Kosan's tidy little terminal and storage facility at Kawasaki, between Tokyo and Yokohama. The area to the right is a U.S. Security Forces motor pool and truck reserve depot, the ship lying offshore, Idemitsu's only oil tanker, the "Nissyo Maru." Idemitsu Kosan K. K. photo.

pansion. Others suggest paring down, rather than boosting foreign exchange allocations for crude oil purchases.

The hand of Government is heavier than in any postwar year on the Japanese petroleum industry.

Government will allot about $130 million for 1955 oil purchases (same as for 1954), it is understood, though somewhat more will be spent this year for crude oil importations. Barrelwise, crude oil imports will rise 1955 over 1954, 51 million against 46,200,000. But there will be a decline in processed oil imports from the 18,648,000-barrel level of 1954.

Crude oil imports during 1954 will be matched during 1955, so far as import areas are concerned. The United States, Venezuela, and Italy will furnish 3.4 percent; Southeast Asia 19.3 percent; and the Middle East 77.3 percent.

Refined oil came primarily from the Middle East, secondarily from North America, thirdly from Europe, the Far East, and Latin America. This import scheme will continue, the officials stress, throughout 1955, except that Indonesia will replace Europe as a crude oil import source.

The MITI has worked out a long-term heavy oil supply program covering the period from fiscal 1955 to 1960, under which the annual supply of heavy oil will decline gradually from fiscal 1955 up to fiscal 1957, due to shifting to coal as fuel for boiler-using industries. After 1957, however, the annual supply total will be increased slowly to 33 million barrels in fiscal 1960.

This will cover anticipated increases in mining and industrial production as well as elevated demand from shipping, agricultural, and fishery industries.

Despite its mutterings over "excessive investment" in the industry, the Government, in at least two cases, has encouraged petrochemical and refinery expansion.

Five oil firms, Maruzen, Japan Petroleum, Koa, Showa, and Mitsubishi, at least, plan establishment of petrochemical plants requiring close to $19 million in outlays. Construction this year, operation next year is the plan of Maruzen, Mitsubishi, and Japan Petroleum, while Kowa expects to follow suit shortly after and Showa, with a projected $11 million plant, later still.

Maruzen will invest $1.72 million to produce 2,700 tons of propane yearly, 2,400 tons of isopropyl alcohol, 10,000 tons of butane and isobutylene, 4,560 tons of isobutyl alcohol, and 3,600 tons of methylethyl alcohol.

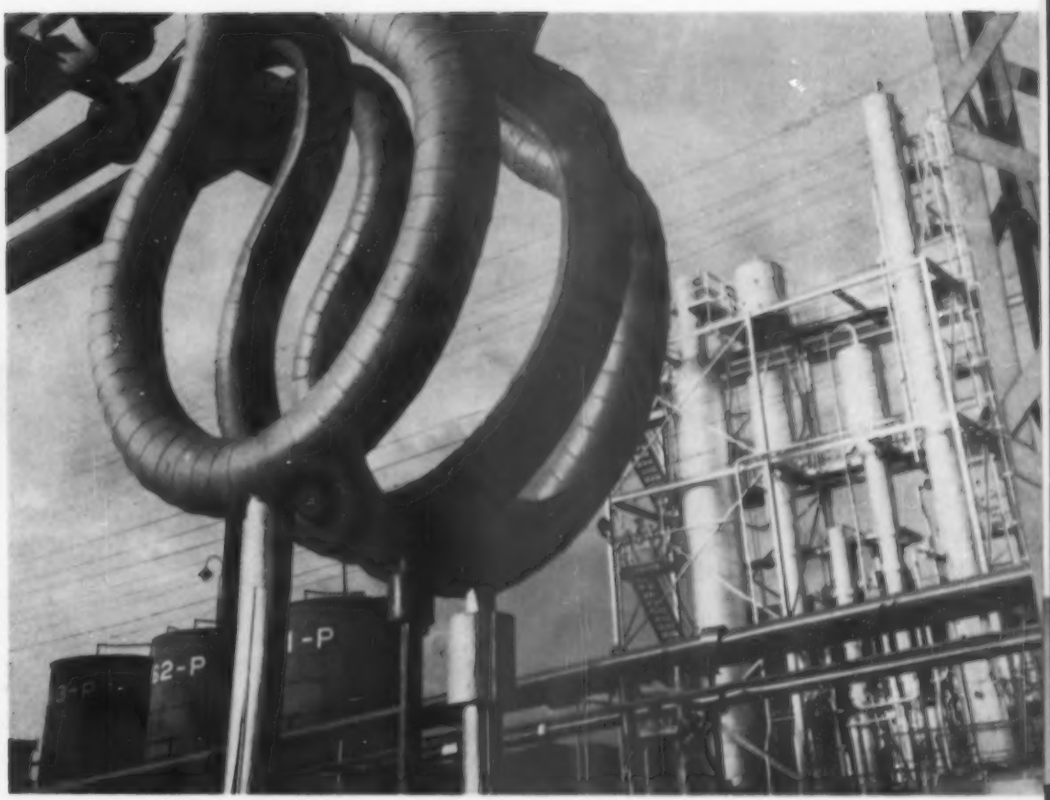
Japan Petroleum programs over $2 million of facilities to produce 5,000 tons of acetone, 2,000 tons of isopropyl alcohol, and 1,050 tons of MEK.

Koa will unite with six former Mitsui companies in petrochemical ventures and will spend $2.7 million of its own money to produce 3,600 tons of polyethylene, 2,400 tons of ethylene glycol, 4,320 tons of acetone, and 7,200 tons of phenol. The other Mitsui firms plan a total expenditure of $18.3 million to assist Koa in its plans. Both Japan and Koa have U.S. ties with the Caltex companies.

Showa will budget $11 million, but other details as to types of products and respective tonnage have not yet been disclosed.

Mitsubishi will set aside $2.7 million to produce 10,000 tons of aromatics, 4,000 tons of benzol, 3,000 tons of xylenes, and 3,000 tons of toluol.

Showa Oil, 50 percent owned by Anglo-Saxon Petroleum Co., affiliate of Royal Dutch Shell, will probably not invest in an actual petrochemical enterprise, preferring to provide oil products for an $11 million plant, 50-50 capitalized by Anglo-Saxon Petroleum and Mitsubishi Chemical. Shell's chemical affiliate. But Showa Oil will raise $19.5 million to be invested in a



A Platforming unit located at the Wakayama refinery of Toa Nenryo, a major Japanese petroleum concern linked with Standard Vacuum. Toa is trying to export oil products to Southeast Asia, via the U.S. firm's sales network. Toa Nenryo K. K. photo.

new joint Shell-Showa oil refinery that will link closely with the petrochemical industry.

Future Government support is a possibility in respect to former naval fuel depot oil refinery constructions. Shell-Showa had the original inside track at the Tokuyama depot in Yamaguchi prefecture, but recently Idemitsu Kosan, Japan's "stormy petrol of the oil industry" seems to have forged ahead into preferred position.

The Government has already sold a small part of the Tokuyama area to Showa Oil, which may build a $19.5 million 30,000-barrel refinery there, scheduled to start building by September 1955 for completion by mid-1957. Showa's bid for the rest of the Tokuyama facility has met snags as well as rivalry from Idemitsu Kosan, which projects a 20,000-barrel refinery through a tie-in with its old friend, The Iranian National Oil Corp., from whom it bought—until its foreign exchange ran out—despite a storm of British protest, attempted court injunctions, and even the threat of high seas seizure and confiscation, in 1953-54.

Idemitsu Kosan may capitalize on Showa-Shell difficulties with the Ministry of International Trade and Industry. The MITI now seeks to transfer the Tokuyama project northward to Yokkaichi, in Mie prefecture, another ex-Imperial Navy depot, but one rather poorly situated. Then too, MITI is bucking recent opposition from the National Defense Establishment which holds that former Army-Navy facilities should be reserved for the newly-formed Self Defense Forces and not be sold to civilian concerns.

Idemitsu Kosan seeks to buy seven million barrels of Iranian crude yearly, to be used in its new 20,000-barrel refinery, but while Showa Oil has troubles with MITI, Idemitsu has struck snags in its price talks with Iranian National Oil Corp., which dislikes the present quasi-barter arrangements, wishing to receive all payments in dollars. Idemitsu to date is adamant on payment of its crude oil bills: 50 percent in dollars and the remainder in Japanese goods bought with yen deposits by Idemitsu in Japanese banks, as heretofore was the case.

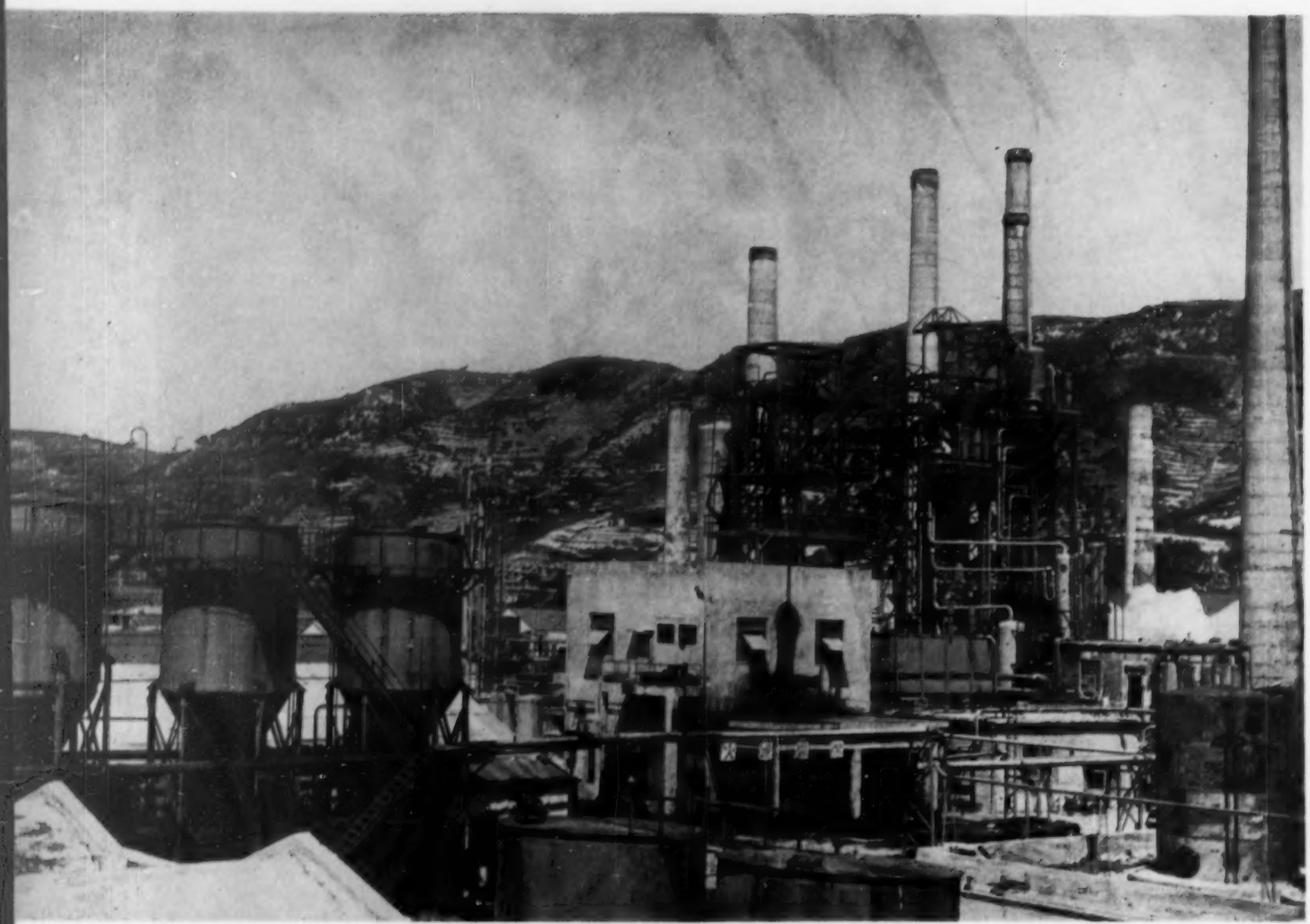
But Idemitsu is restive as ever and continues to make plans rather than mark time. It has an application for a $7 million loan from the Bank of America to cover part of the Tokuyama refinery construction costs of $16 million, and plans to build two 30,000 dwt tankers, each costing $4,170,000, to be used to transport Iranian crude oil.

Daikyo Oil, another independent, is doing a volume business with the Iranian National Oil Corp., having already imported a total of 280,000 barrels of crude oil from November 1954 through April 1955. Daikyo, which has a few small tankers of its own, plans to charter one more, to import 50,000 barrels of crude oil from Iran before the close of calendar 1955.

Japanese oil refiners are attempting to export jet fuel and other oil products to foreign markets, especially to the traditional Southeast Asian territory, this, paradoxically enough, even though present supplies of both domestic and imported crude oil are scarcely enough to meet Japan's own growing home demands.

Toa Fuel Co., linked with Standard Vacuum, has filed an application with the MITI for approval of export of oil products to Southeast Asia, while Maruzen Oil has concluded a contract with the U.S. Defense Department for sale of jet engine fuel within Japan to the U.S. Security Forces in Japan.

Toa Fuel in 1954-55 completed a crude distillation unit capable of handling 22,000 barrels of crude petroleum, sending its total crude capacity up to 52,000 b/d as against



A vacuum distillation and contact re-run plant operated by Toa Nenryo, one of the pioneers in Japan's new petrochemical industry. Toa Nenryo K. K. photo.

its foreign exchange quota which is enough to bring in only 21,000 b/d.

Through the Standard Oil sales network in the Far East (dollar area), Toa Fuel had devised a plan to export and applied for Government approval. Thus, very likely Toa, and other Japanese oil companies linked with U.S. concerns, will be able within a short time to ship refined products to Southeast Asia, almost all distributed by American concerns.

Toa's application pointing out its desire to export oil products noted its desire to have a sum equivalent to 90 percent of the total export proceeds allocated to it as foreign exchange quota for the importation of crude oil to be refined for export purposes.

The Maruzen Oil Co., which sent its managing director to Washington earlier this year, has concluded a contract, it is understood, with the U.S. Defense Department for sale of 40,000 barrels a month of jet engine fuel, to be delivered from April through September 1955, to the U.S. Far East Air Forces.

Unlike the previous contract signed between Maruzen and FEAF for 25,000 barrels per month, the present contract involves large quantities of oil, and is regarded as an export contract.

In view of these developments, the Ministry of International Trade and Industry indicated it will reconsider the existing preferential arrangement made in favor of the Maruzen Oil Co. for the purpose of placing the present experimental production of jet fuel on a full fledged production basis. MITI has given a special foreign exchange quota to the Maruzen company for import of crude oil for its jet fuel production program by cutting allocations to other Japanese oil refining companies.

Japan Oil Products Co., linked with Caltex on a 50-50 basis, is also interested in such an "export arrangement"—sales to the FEAF or the U.S. Security Forces in Japan for dollars.

And the Japanese Government, though it faces problems in bringing in and producing enough petroleum domestically, may well permit large-scale export of refined products for the first time in Japan's history, and before the close of 1955.

Crude oil imports would have to be expanded and foreign exchange, already low, would be forced to go lower by being thus disbursed. But, some officials reason, this would be balanced by the great gain in exports and export earnings.

As matters now stand, the industry is in the throes of an interesting all-important tug of war between various branches of the Government seeking on one hand to

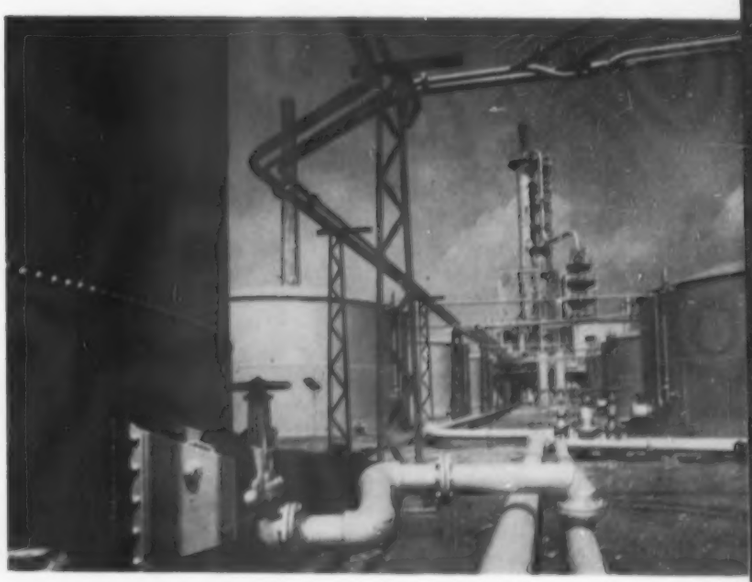
A topping plant at the Nihon Sekiyu K. K. refinery. Nihon Sekiyu K. K. photo.

One of the network of Japan-wide filling stations that has materialized from the Caltex-Japan Oil Products Company 50-50 tie-in. Japan Oil Products photo.

tighten its grip on the industry, and yet in other ways, actually relaxing that hold. Industry, as well, is half fighting and half encouraging Government encroachment.

The Government is in the position of a juggler. It frowns on expansion of facilities, yet it aids such expansion. It frowns on boosted imports, yet it helps prepare for expanded exports that, *per se*, will mean having to boost imports. It seeks to aid Japan's industry to minimize reliance upon foreign oil firms, yet it takes steps to bring about an equal continuing amount of such dependence. It tries to balance itself between favors to the refiners of domestic crude to bring up production totals, and to the refiners of imported crude only, so as to bring about export potential.

Above all, it finds itself divided as to how best to develop Japan's own home oil resources and how best to get into a major new industry—that of petrochemicals.



Overall storage tank and refinery shot at Yokohama. Mainichi photo.

Ahmed Malabary of Bahrain learns as he practices welding with help from his instructor, Richard Heathershaw, in one of the company's many training programs for new employees. Photos courtesy Bahrain Petroleum Co.

Good neighbor idea works well in BAHRAIN

C. R. Barkhurst, general manager of Bapco, escorts the Ruler of Bahrain, Shaikh Sir Sulman bin Hamad al Khalifah, on an inspection of the mobile dispensary given to the Government by the oil company.

By Allison F. Roenigk

OIL IS OF COURSE Bapco's business, but like most oil companies in the Middle East, the Bahrain Petroleum Company Limited, a member of the Caltex group, has become a good neighbor as well as a successful business. This is the story of the American-owned company that has practiced for 20 years the good neighbor policy in the Persian Gulf.

The Shaikdom of Bahrain has been under the protection of the British government for nearly a century and its rulers have benefited wisely from British assistance. His Highness Sir Sulman bin Hamad al Kahlifah, and his advisor, Sir Charles Belgrave, typify today a happy blending of the Middle East and the West.

E. A. Skinner, Bapco's vice president in charge of government relations, paid tribute to the Ruler and his advisors in bringing progress to the people as they were ready to receive it. He said that the tempo of modernization has been stepped up in recent years. The pace has been quickened as the needs of the people are felt, but it has been a moderate pace through the years.

Twenty years ago the small villages resisted the government efforts to build schools in their centers. Today the villages are clamoring for more education for their children. As a good neighbor, Bapco in the past two years has built and donated four schools in outlying villages to help the government satisfy this demand.

The company in 1954 also gave the government a fully-equipped mobile dispensary on a six and a half ton truck base. The dispensary will bring medical aid to the people in villages at a distance from the government hospitals.

In addition, Bapco has surveyed the underground water supply of the almost arid island and has given the government technical assistance in conserving this vital resource. Road building is another contribution of the company to Bahrain. In the course of developing the oil field, Bapco has constructed most of the roads on the

island except for those on the northern part.

Smooth and efficient operation of oil fields and the refinery is the first concern of an oil company. Finding and developing the oil on the island is the company's main achievement, but next to this Bapco takes pride in its program of educating and training native workers in the ways of western technology. Both the company and the Bahrainis faced a tremendous challenge after the first producing well came in 23 years ago. Both have met this challenge in a way that makes Bahrain a happy spot in the Middle East.

Individual examples are more interesting than a statistical measurement of the success of this program, and there are many examples of Bapco's success that may be quoted. From office boy to administrative assistant is a real climb for any man, but Abdullah bin Hussan Khalfan achieved actually far more than an American would with a similar background. An American normally would have at least a high school diploma; he would start work in familiar surroundings. Telephones, adding machines and typewriters would not be magical objects to him. And not the least, an American naturally would be fluent in English, instead of facing a foreign language such as Arabic. True, Abdullah had four years of schooling when he joined Bapco in 1935, yet he had to conquer the language barrier which he later hurdled expertly. After learning English, he mastered typing, then general office work as a clerk, followed by accounting, until he became head of an accounting section.

Today Abdullah is administrative assistant to the head of the accounting department. He advises, plans and follows up the training of other Bahrainis who are benefiting from Bapco's courses in English, typing and general business procedures.

Cars, trucks and tractors are familiar to most Americans. To the Arabs in 1934 they were extraordinary sights when Abdul Ghaffer bin Mohammed started as a cleaner in the transportation division of Bapco. After a course of washing cars, he learned to drive everything up to a 20-ton trailer truck. He progressed to become a dispatcher, then top night dispatcher and now is head dispatcher. He plans and supervises the moving of all oil drums from the refinery to the wharf, loading and unloading the drums from the trucks to the ships. Besides his work, he serves as a trustee of the Rupee Thrift Fund and on the Housing Loan Committee, both company-employee enterprises.

Bapco trained Abdul just as they are today training growing numbers in a variety of mechanical skills. Nearly 50 percent of all Bahraini employees of the company are undergoing some sort of training all the time, either on the job, in company schools or at the Bahrain government's technical school for mechanics and construction. The young boys and men learn to handle trucks, lathes, welding torches, saws and hammers. Special courses are offered for boilermakers, pipe-fitters, masons, machinists, electricians, instrument and garage mechanics. Each year 70 or more students from the Bahrain schools are employed by the company and trained during their three-month summer vacation.

In addition to the "on the job" training and courses at Awali, Bahraini employees may enroll in voluntary evening classes in English and arithmetic. Bapco sponsors a number of scholarships in the government secondary and technical schools for local boys. The company gives four scholarships a year for outstanding Bahraini students at the American University at Beirut, Lebanon. It also sends a number of its employees to the summer session at the University as well as to such special courses as the General Motors diesel school in Bombay, India.

Abdul Aziz has replaced a European as foreman in charge of the discharge and hauling of freight from ships and moving packaged products to be loaded on freighters at the Sitra wharf. Starting as a laborer 21 years ago, Abdul Aziz learned English in night school and his steady efforts have been recognized by his equally steady promotions.

A young boy working in a local carpenter shop was attracted by the first American oil men who came to Bahrain. Fatullah bin Mohammed helped drive the first stakes for a generator platform and a bunk house on the site of Awali, the oil company town. He has been building at Awali ever since and today he is in charge of all construction work on new housing. During the peak of the late war he supervised some 4,000 men, company employees and local contractors. In recognition of his outstanding service, the company two years ago sent Fatullah on a trip to Europe, where he inspected the plants in Holland and Sweden that precut the lumber he uses to build the new homes in Awali.

A slender, articulate Bahraini, Fatullah neatly summed up the impact of oil prosperity on this island shaikdom in the last 20 years. He said, "One day my boss asked me why everything cost so much more than it had in the past. So I told him this story. My father had never owned a wrist watch. I was 20 years old before I had earned enough money to buy a watch. Now, my son who is only ten years old asks me for his own wrist watch. So you can see why things cost so much these days."

Western ideas applied in the Middle East can cause some results surprising to the westerner and the Bahraini alike. Fatullah was jokingly scolded one day by his European superior for leaving his wife at home when he went to the movies. The genial foreman said, "Well, I sent her to the cinema and she saw a fine picture. But she could not forget one scene which showed a new refrigerator in a home. When I came home that night, she immediately asked for an ice box. So the next day I went up to my boss and told him what had happened. I said that his idea would cost him more money."

Education for children of European employees is not neglected by Bapco. The

Nearly half of the 8,000 local employees receive some type of training at company expense as do these men leaving the Bahraini school center at Bapco.

An employee has his wound dressed at the company hospital in Awali, one of five clinics maintained by Bapco for its employees.

company supports a grammar school for 250 students at Awali that meets British and American standards. Parents are given a monthly allowance for each pupil in an approved secondary school that they select, perhaps in Europe or elsewhere. The company also pays the transportation costs for one visit to Bahrain per child during a contract of the employee.

Wages are a basic factor in a company's relations with its men and the Bahrain Petroleum Co. tries to follow this rule in an enlightened manner. C. R. Barkhurst, the general manager, explained that the company's policy is to provide wages and pay that are fair and equitable and that the prevailing cost of living is an important factor in applying this policy. He added that the company aimed continually to give its employees more money than just enough to buy food and to pay the rent.

With the government of Bahrain, the company studies periodically the cost of living on the island. As a result, in 1952, increases up to 25 percent were made in the wages of practically all employees on the rupee payroll, comprising those paid in local currency. Further, the company's policy is shown in the record of wages paid from 1946 to 1952. During those seven years, the total of wages and salaries for local employees jumped 205 percent over the 1946 level. At the same time the total number of employees increased by 73 percent.

Housing is a problem on a sandy island where the native building material, coral stone slabs, is salvaged from the sea flats. Most of the 6,000 Bahraini men at Bapco naturally prefer to live at home, often in their native villages.

Most people do not like to live in industrial towns and the people of Bahrain are no exception, according to Mr. Skinner. The Bapco vice president said that when he first came to Bahrain 24 years ago, the company tried to work out a special community for local employees. The plan fell through when the company could not interest the workers in the idea of living in strange communities. Today the company has worked up two plans to help its men acquire better homes while living in their own communities.

Some 360 Bahraini employees have built or remodeled and enlarged their homes through Bapco's housing loan plan. In operation only a year and a half, the plan is popular with the men from the highest paid monthly employee to those on daily rates.

The scheme is simple, designed to enable employees to acquire a permanent house instead of living in a *barasti*, or a small home built of palm fronds. Any employee of five years service and between 21 and 55 years old may borrow up to 100 percent of his equity in the Bapco thrift fund which grows in resources through his own savings and company contributions. Interest of four percent a year is charged. Repayment is made at the rate of at least ten percent of the total wage per pay period.

An employee committee grants the loans which may be for 300 rupees to build a wall or for 5,000 rupees to build a new house. The chairman is a representative of the management and the six other members are local employees. Before a loan is granted, a member of the committee will inspect the proposed addition to a home or the site of a new house, discuss the plans with the employee and check his proof of ownership of the land. The housing plan is an extension of the company's thrift plan, the first to be started in the Persian Gulf area.

Mr. Skinner says that the housing loan plan is popular because most of the people are ambitious to own their own homes. A typical house built under the program is made of cement and coral stone slabs and includes two rooms with an outside shelter for a kitchen. The entire house and yard is enclosed by a wall to give essential privacy in this Moslem country.

Of course, the 1,143 European employees of Bapco have no choice in the matter of housing. They are provided attractive one-story homes by the company in its modern town of Awali, some 15 miles south of the main island city, Manama. Mr. and Mrs. Skinner lived in a quonset hut in the desert when they arrived in the early thirties to prospect oil on Bahrain. Today, the Europeans working for the company have all the comforts of air conditioning, electricity, gas stoves, and refrigerators. Mr. Barkhurst said that the policy of the company has always been to provide good living conditions for its employees and as soon as oil came in, houses were started in Awali. New houses are being added each year to the company town.

There are some 500 family housing units at Awali, ranging from one and two bedroom duplex homes to detached houses of two and three bedrooms. All basic equipment and furniture is provided by the company. The neat blue, green or white homes make an orderly and impressive sight, located as they are in the midst of the softly sloping desert. Inside the compound, oleander bushes, thorn trees, salt cedars and hedges of mock jasmine decorate the streets and yards, defying the arid desert through irrigation.

Bachelor quarters are provided for the single men and women and men waiting to bring out their families from Great Britain, the United States, Canada or Australia. Special bachelor quarters have also been built for single Bahraini men and the Indian and Pakistani employees. These individual compounds are tailored for the preferences of the various groups and include a new mosque, large swimming pools and recreation halls.

The Bapco plant is fairly isolated from the main centers of Manama and Muharraq. For the convenience of its employees, the company maintains its own transportation system. This system is coordinated with other buses which connect the outlying villages with each other and with the two towns. The large red and green trailer buses of the company carry some 6,000 persons a day to and from their jobs. Local buses in Awali also transport European employees to the office, the commissary or the movies.

Although the Bahrain government maintains well equipped hospitals, Bapco supplements these facilities with five dispensaries and a 110-bed hospital for its nearly 9,000 employees. The health program has

Members of the housing loan plan committee inspect the house of an employee who has applied for funds to improve his home. The new company plan has helped over 360 men to build or enlarge their houses in the last two years.

helped keep down time lost on the job due to illness and accident. In 1952 the figure was 2.25 percent of the total working days, a figure that compares favorably with the record of any large industry in Britain or the United States.

The oil company hospital at Awali includes two wings, one for Europeans and one for Indian and local employees, both fully air-conditioned. The plant is designed to take care of all medical and surgical cases, including major surgery. The company provides a staff of 12 doctors, six Europeans and six Indians. There are 11 nurses, six Indian male nurses and three laboratory technicians as well as 190 Bahraini employees to maintain the hospital.

A unique feature of the hospital staff is the small group of Bahraini women who work in the women's wards. This is a new departure in this Moslem country and has proved very successful. Women attendants are a matter of course in Western hospitals, but here the women are very seldom employed outside their own homes.

An iron lung, an electrocardiac machine and modern X-ray equipment are among the special equipment not normally available in Bahrain. The company operates a walking blood bank and exchange blood transfusions have been carried out on babies. From 50 to 80 European babies are born each year in Bahrain.

The two ambulances for employees are fully staffed by Bahraini ward attendants trained to handle stretcher and other emergency cases. These attendants have been trained by Bapco following its policy of educating Bahrainis to take as wide a part as possible in the company operations.

Outpatient attendance totaled 113,044 in 1953 at the five dispensaries in Awali, at the refinery, at the drum plant and in the center of Manama. In addition to the clinics and the hospital, the company health program includes sickness, accident, disability and death benefits. The tuberculosis plan is the only one of its kind in the Persian Gulf. It provides leave of absence and financial assistance to employees during recovery from the disease, a fairly common one in the Gulf.

Bahrain, with much of the Gulf area, once had a bad reputation for malaria. Today this disease has been practically eliminated on the island through the efforts of the government and the company. Mosquito breeding places, such as the many irrigation ditches, are sprayed frequently, sometimes daily, by Bapco crews and Bahrain government employees.

There is plenty of play as well as work in Awali for Bapco employees. Motion pictures are popular with everyone and the new air-conditioned cinema house, finished in 1953, often attracts a capacity of 650 persons. Swimming is the preferred sport during the summer heat. There are two pools inside the company compound as well as new pools reserved for Bahrainis. A fourth pool is being built at Rafa'a in the refinery area. Football (soccer to Americans) is popular during the winter among Bahrainis and Europeans. The company has provided three fields where the various departmental teams compete vigorously. Bapco teams also take part in the Bahrain football league. Seven tennis courts, two squash courts and an 18-hole golf course are other recreation facilities available to company employees.

Naturally the best type of recreation is a vacation and company employees all enjoy holidays each year. Local employees earn two weeks annually or three weeks annually after ten years of service. Following the almost universal practice, Bapco overseas employees are granted longer periods up to four months at the end of each contract. A contract runs two years for a bachelor or 30 months for a man of family in Awali. Sick leave is accumulated at the rate of two or three weeks a year depending on length of service with the company.

Like any good neighbor, the Bahrain Petroleum Co. is interested in its employees and in the welfare of Bahrain. Its interest has been demonstrated in the record of the past 20 years. In the last few months, for example, the oil company has given the government a complete radio station, and this gift fills a vital need on the island that lacks a daily newspaper or any local news coverage.

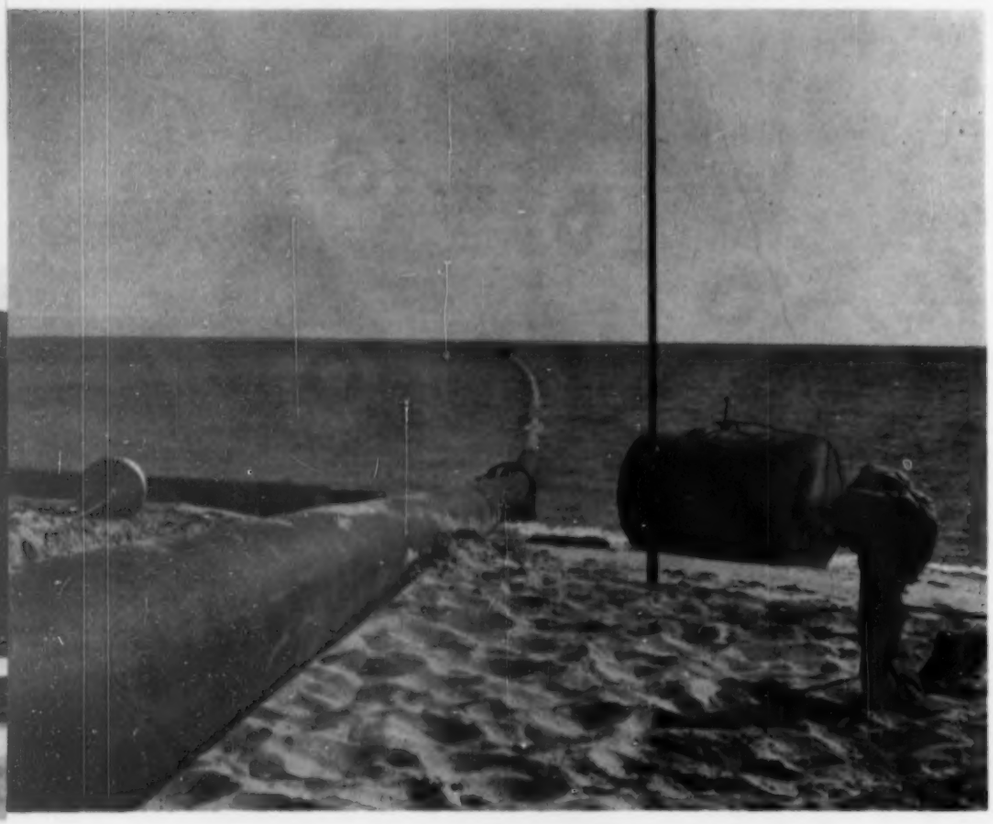
Perhaps Fatullah bin Mohammed summed up best the island's attitude toward Bapco. He said, "When I joined the company 20 years ago, I was a boy and not able to support a family. Now I have a wife and eight children and I am only waiting until my oldest son takes my place to retire. Pretty good service, don't you think? And a pretty good company, too."

Bapco crews, cooperating with the Bahrain Government, spray irrigation ditches in the joint anti-malaria program which has brought this once prevalent disease under control.

Captain I. W. Buch, who was responsible for the laying of the Neutral Zone submarine pipe line.

SPEEDY LAUNCHING OF SUBMARINE PIPE LINE

Shore end of submarine line in position while the line is gradually sinking from the sea end.

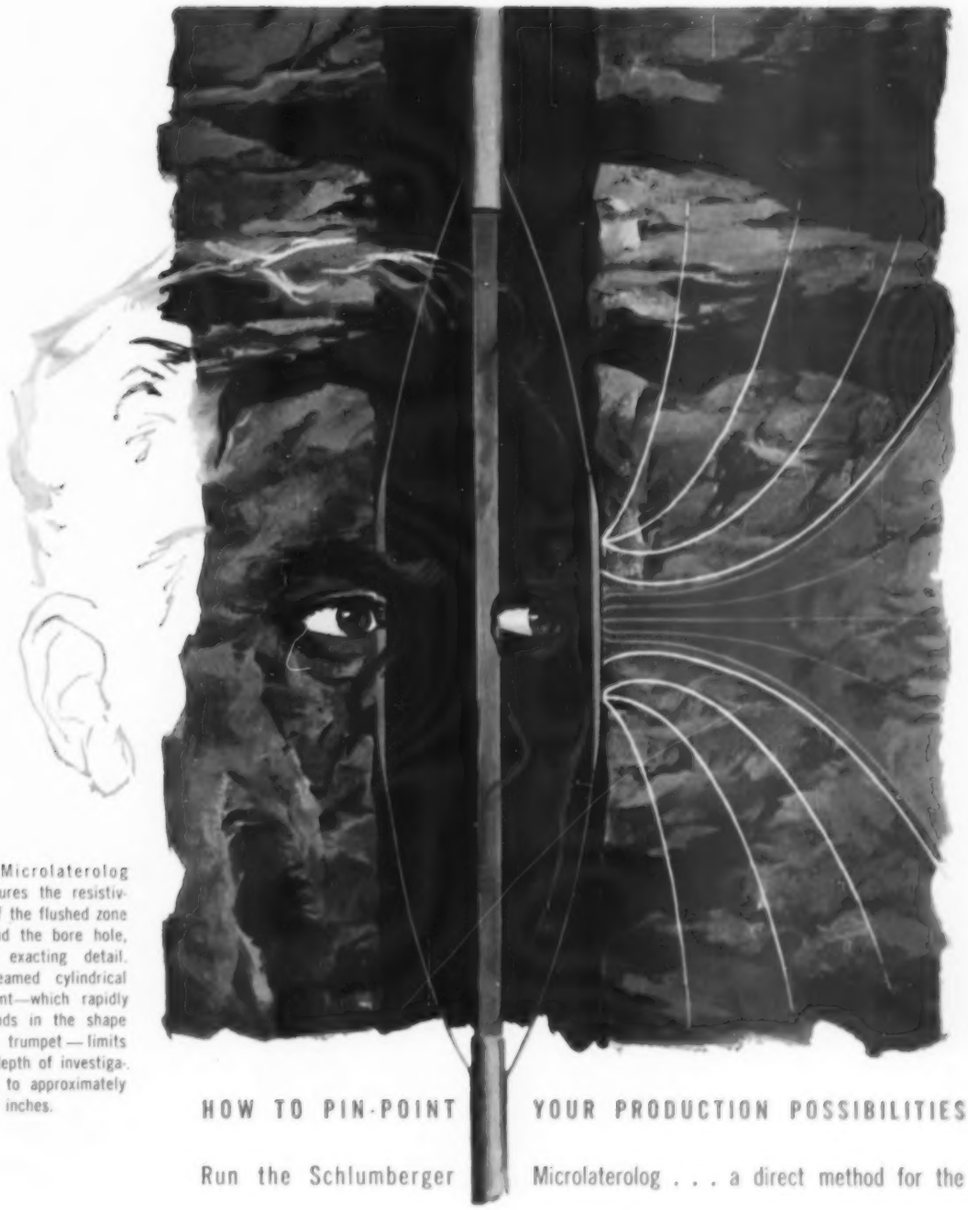


SOMETHING OF A record, at least in the opinion of the men who participated, was established in the laying of a submarine pipe line to an offshore loading station in the Persian Gulf last October. The line was built for the Pacific Western Oil Corp. to facilitate the movement of crude from the concession which the company holds jointly with the American Independent Oil Co. in the Neutral Zone lying between Kuwait and Saudi Arabia.

The oil handled by the line comes from the Wafra field jointly operated by the two companies. Because of the lack of harbor along this part of the Gulf, it was decided that the most economical method of handling the oil was to construct an anchorage at a spot to which the name Mena Saud was given and to connect this with the shore station by a submarine line. Selection of the method to be employed and responsibility for the project was left to Captain I. W. Buch, who had directed the design and building of a dozen offshore lines in the Near and Middle East.

The length required by the line was 8,674 feet, approximately 1¾ miles. An outside diameter of 20 inches was specified with ½-inch wall, a total weight of 404 tons with a positive buoyancy in sea water of 542 tons.

The Mena Saud terminal is situated on Ras Az Zour Point 30 miles to the southward of the Kuwait Oil Company's loading docks. The low, level, sandy ground lent itself to the laying of a railroad track with a minimum of trenching and backfilling. Moreover, the sea bed was considered sufficiently level for the pulling of a submarine line. However, the orthodox method of placing the welded length of pipe line on dollies running on a railroad track, at a more or less right angle to the shore, terminating in a dolly pit from which the pipe would enter the sea and then be pulled on the sea bed to its final position, was abandoned due to the cost of hiring a large tanker and tugboats for pulling and the difficulty and high cost of obtaining and laying a railroad track with more than 200 dollies. Another method of launching the pipe from a railroad track—floating it to its position and sinking it—was also aban-



The Microlaterolog measures the resistivity of the flushed zone around the bore hole, with exacting detail. A beamed cylindrical current—which rapidly expands in the shape of a trumpet—limits the depth of investigations to approximately three inches.

HOW TO PIN-POINT YOUR PRODUCTION POSSIBILITIES

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The Emsland Houdriflow cracks straight run and coker gas oils and, in addition, desulphurizes the straight run and coker gasoline simultaneously. The refinery is currently processing a mixture of Georgsdorf and Emlichheim crudes. A unique processing scheme is employed at this refinery. No crude distillation unit exists; the Houdriflow feed stock comprises all flashed straight run materials from the crude as well as total coker effluent—gas, gasoline and gas oil. This integrated arrangement eliminates intermediate storage, thereby reducing operating and equipment costs.

A new brochure describing the Houdriflow process is available on request. Houdry Process Corporation, 1528 Walnut Street, Philadelphia 2, Pa. International Representative: World Commerce Corporation, S. A.

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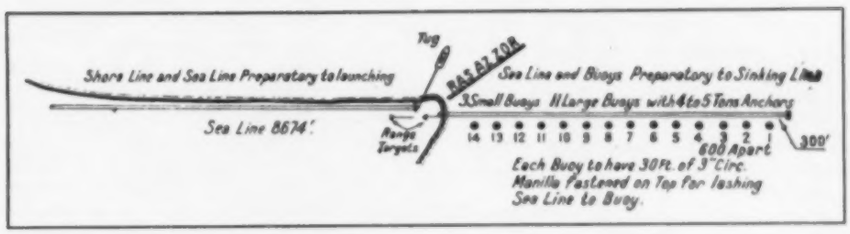
Tug
RAS AZ ZOR
Shore Line and Sea Line Preparatory to launching
Sea Line and Buoys Preparatory to Sinking Line
3 Small Buoys 11 Large Buoys with 4 to 5 Tons Anchors
Sea Line 8674'
Range Targets
14 13 12 11 10 9 8 7 6 5 4 3 2 1
300'
600 Apart
Each Buoy to have 30 Ft. of 3" Circ. Manilla Fastened on Top For lashing Sea Line to Buoy.

Ras Az Zour, showing submarine line on north shore prior to launching, and line floating against the 14 line buoys prior to being sunk.

doned because of the high cost of acquiring and constructing the equipment. The final decision was to weld the pipe on the beach parallel to the seashore and to launch it from that position.

The sandy shore line of Ras Az Zour runs practically north-south and east-west, forming almost a right angle at the point. Both shore lines are fairly straight for a distance of 9,000 feet on each side. Due to the accessibility of the north shore line for unloading pipes from trucks, this was selected as the launching site.

The welding of the 1¾ miles of pipe was done over trestles a few feet from high water mark and as the welding proceeded the trestles were shifted and the welded pipe placed on the ground. The sea end of the pipe was fitted with a flange and blind flange in which were three screwed 4-inch bull plugs. A lug for the towing and lowering shackles was welded one foot from the flange. On the shore end was welded a cap into which was fitted a 4-inch coupling with bull plug. A lug was welded one foot from the cap to serve as a towing and lifting shackle. The submarine pipe was not coated, but provisions were made for cathodic protection.

Due to the weight of fittings on the sea end of the pipe, a float consisting of two 30-foot lengths of pipe was lashed to the submarine pipe near the end to give additional buoyancy. On the line of direction of the projected submarine site, 14 large buoys were anchored 600 feet apart with one-inch wires to 3-ton anchors.

October 23 was selected for launching the line due to the small rise and fall of the tides, being three feet and four feet respectively, with minimum current. During the night three sideboom tractors shifted the line about 30 feet to the low water mark. Four launches of 135 hp and one of 165 hp were standing by at daylight.

At 8.50 a.m. the current was at a standstill at high water and the 1¾ miles of pipe were afloat. One launch commenced pulling the sea end away from the beach. A second launch fastened a tow line on the sea end of the pipe and it moved ahead at a rate of about four miles per hour. The current was gradually shifting as the tide began going out and the pipe drifted, as intended, down on the 14 line buoys. One launch fastened a tow line on the shore end and towed it to its position. Ropes from the 14 buoys were fastened around the pipe to keep it from drifting over and away from the buoys. By using VHF sets on a launch at the sea end of the pipe and at the shore control station, it was determined when the pipe was in position for sinking. The pipe float was cut loose, the three bull plugs on the sea end were removed and the pipe began sinking. On shore the four inch bull plug was removed and a four inch valve fitted in order to regulate the speed of the sinking of the line, or to stop it should this become necessary. However, the pipe was sunk without incident. Following are actual times for towing and sinking of the line, giving a total of two hours and thirty-five minutes for the whole operation:

8.50 a.m.—Launch towing end of pipe away from beach.

9.10 a.m.—Pipe moving ahead.

9.35 a.m.—Sea end of pipe in position.

9.50 a.m.—Shore end pulled into position.

10.40 a.m.—Bull plug open on shore end.

10.43 a.m.—Bull plug open on sea end.

10.48 a.m.—Sea end of line resting on sea bed.

10.52 a.m.—3,000 feet of pipe resting on sea bed.

10.55 a.m.—4,500 feet of pipe resting on sea bed.

11.18 a.m.—7,500 feet of pipe resting on sea bed.

11.25 a.m.—8,674 feet of pipe resting on sea bed.

At the terminal the sea line was welded to the loading line from the pump station. Suction pipes from the four crude oil storage tanks are 20-inch diameter.

Tankers arriving at the terminal for loading are moored by their two bow anchors and stern lines to three mooring buoys. A reducer is fitted on the 20-inch submarine line to take the 10-inch flexible loading hose, about 200 feet long. After being moored in position, the flexible hose is raised to the tanker's deck and clamped to the ship's manifold. VHF sets carried by the mooring master provide communication with shore.

Sea end of submarine line, with buoyancy float, being towed to its position.

Argentina Contract

(Continued from page 67)

private property of the federal and state governments, whether they were located under federal or state land; the development of the federal oil resources was to be carried out exclusively by Y.P.F. By this law Y.P.F. was empowered to enter into agreements with the governments of the states for developing their oil resources and also to organize mixed companies with private capital for the exploration and exploitation of possible oil bearing zones.

In 1935 the government had Y.P.F. and the private companies enter into agreements known as the "Convenios," prorating the gasoline market among the marketing companies, taking as a basis the proportion that each one was supplying in 1935. These agreements were complemented with petroleum export and import regulations.

During the period of Silveyra's directorship, oil exploration and drilling was activated by Y.P.F. and new discoveries were made in Mendoza, new fields were opened in the Comodoro Rivadavia area, Neuquen and Salta, and Y.P.F.'s oil production continued its upward trend. New refineries were erected in the states of Mendoza, Salta and Santa Fe, and the La Plata refinery was tripled in capacity.

In 1939, Y.P.F. was producing 55 percent of the total oil produced in the country and supplied 37 percent of the gasoline marketed. During World War II foreign oil supply was practically shut off. The private oil companies pooled their production and prorated the available crude proportionately to their gasoline market requirements.

After December 1941, equipment and special materials for drilling, producing and refining of oil could not be received from the U.S.A. and were not available in the country. However, all the companies managed to maintain their production, until output began to decline. When the war ended, the Argentine oil industry, which had forced its plants and field equipment, was faced with an increasing demand for oil products and in need of materials which were difficult to import.

During this same period, the government rationed gasoline, fuels and electric power. After the war, rationing of gasoline and liquid fuels was continued partially for nearly three years. Despite all its efforts, the demand for petroleum and its products continued at an increasing rate. This increase in petroleum requirements had to be satisfied from foreign sources, thus imposing on the country's available exchange.

In an endeavor to find a satisfactory solution to the problem raised by the shortage of national fuel and power supplies, the government organized in 1946 the National Power Board, (Direccion Nacional de la Energia, DINIE) and established new state companies for developing local resources of solid fuels and hydroelectric power. Consumers of gasoline and liquid fuels had to pay a premium on posted prices of fuel. This premium went to augment the national power fund for developing the country's power resources.

In 1946, a large number of officers, including the general manager, with many years of service in Y.P.F., were removed from their posts. In the following years, frequent changes took place in management and directorship, thus handicapping its development. Y.P.F. began to lose its leadership of the national oil industry and, from a self-supporting prosperous enterprise, became a government-supported organization.

It was under these circumstances that in 1947, Congress passed a law cancelling the "Convenios" and gave Y.P.F. freedom to import crude oil and petroleum products, and this company became the largest oil importer. The trade agreement between the United Kingdom and Argentina was based mainly on the trading of meat for fuels.

In an effort to increase its oil production and in possession of an important number of wildcat locations determined by their geological and geophysical parties, Y.P.F. contracted with Drillexco to drill wildcat wells in different parts of the country. After the company drilled a few wells, the contract was cancelled by both parties.

About the same time, Glenn McCarthy made an offer to bring into the country drilling equipment and specialized personnel to intensify the oil production, which proposal was not favored by the government.

Proposals had also been made, by Argentine and foreign groups, to act as drilling contractors for Y.P.F. so as to increase the number of wells drilled in proven fields. These propositions were also turned down.

The government, not satisfied with the development of the power resources by the state companies, put all its agencies in charge of the development of the country's power and fuel resources under one board of directors, with the chairmanship of the Minister of Industries. This board became known as ENDE (Empresas Nacionales de Energia).

On different occasions, President Peron expressed the need for intensifying, by every possible means, the development of the country's power resources and stated that, if the state could not reach self-sufficiency through its own agencies and by its own means, the government would have to accept private cooperation. The second five-year plan established that the state shall encourage private capital willing to share in the exploration and development of the country's power resources, providing for the country's security and in accordance with the regulations of the national constitution.

This provision, made known at the end of 1952, encouraged private groups like Royal Dutch/Shell, Standard Oil of New Jersey (Esso Argentina), Dresser (The Odlum group, Atlas Co.) and Standard of California to offer financial help and "know how" for the development of the country's resources.

The President appointed a technical committee formed by men from Y.P.F., the Ministry of Industries, the Secretary of Economic Affairs and two representatives of Congress (one for each house) to study the different proposals which have been presented.

The contract is expected to come to a vote in the Argentine Congress before September 30. The Congress is not expected to make modifications in the contract, which will either be accepted or returned to the negotiating committee.

The first negotiation to meet with success is the one with Standard of California which organized a subsidiary, California Argentina, incorporated in Delaware. On April 25, 1955, J. H. Haynes, in the name of this company, signed the contract with the Argentine government represented by the Minister of Industries Dr. Santos.

The contract, made up of 71 articles, three exhibits and a guarantee of Standard, has been outlined above. Details of other pending proposals which are not so far advanced have not been revealed.

TABLE III

CRUDE OIL RUNS IN ARGENTINE OIL REFINERIES

(Barrels Daily)

Year	National	Imported	Total
1930	(1)	(1)	38,356
1935	(1)	(1)	57,534
1940	56,986	10,082	67,068
1945	63,562	2,685	66,247
1950	63,287	59,452	122,739
1954	79,863	73,699	153,562

(1) Not available.

TABLE IV

ARGENTINE REFINING CAPACITY IN 1953

Refinery	b/d	% of Total
Yacimientos Petroliferos Fiscales		
Eva Perón (Buenos Aires)	79,452	
San Lorenzo (Sante Fé)	16,438	
17 de Octubre (ex Ultramar) (Bs.As)	5,494	
Luján de Cuyo (Mendoza)	4,109	
Chachapoyas (Salta)	2,192	
Plaza Huincul (Neuquén)	1,370	
	100,322	64.1
Petroquímica E.N.	6,575	4.2
Esso (S.A.F.A.)		
Campana (Buenos Aires)	24,657	
Puerto Galván (Buenos Aires)	5,205	
Elordi (Salta)	1,096	
Dadin (Neuquén)	274	
	31,233	19.8
Diadema Argentina S.A. (Bs. Aires)	16,438	10.4
La Isaura (Buenos Aires)	1,370	0.9
Latero, Papini y Cia. (Lubs and Solvent)	822	0.5
Ragor y Cia. (Lubs and Solvents)	164	0.1
Total	**157,425**	
Cia. General de Asfaltos (Lubes from distillate received from Petroquimica E.N.)	438	

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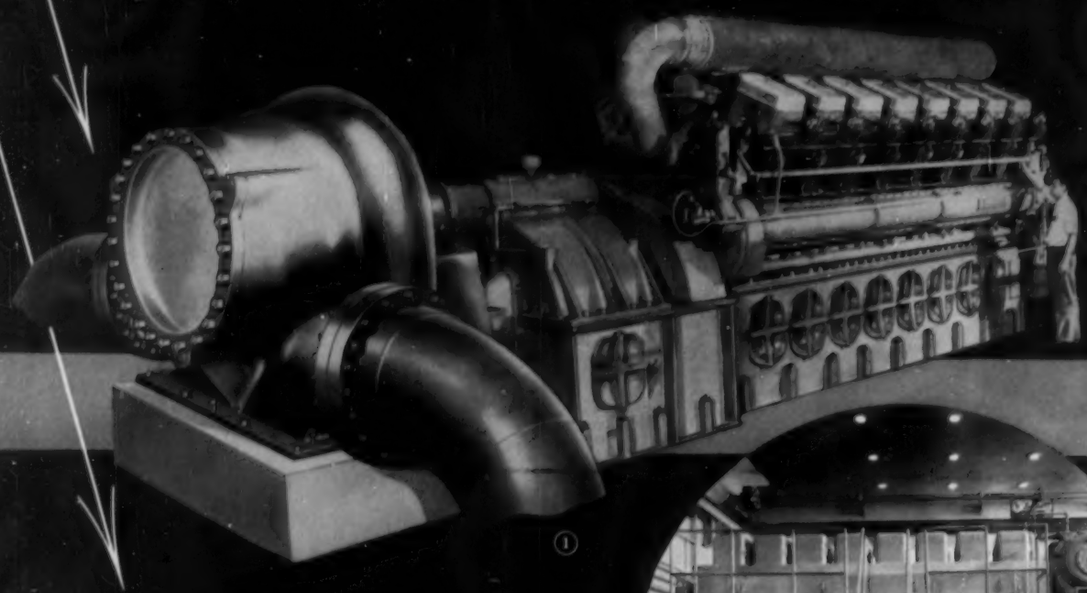

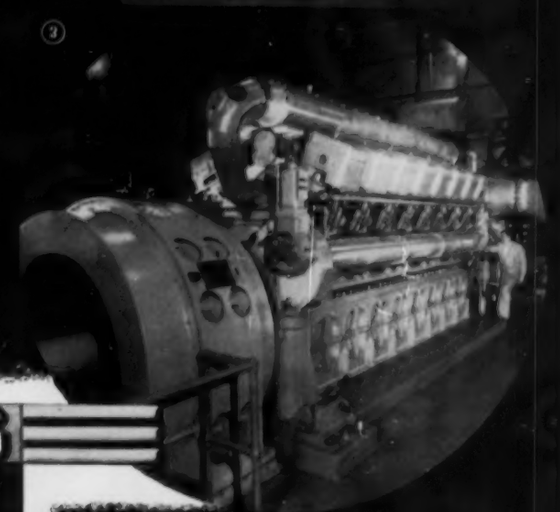

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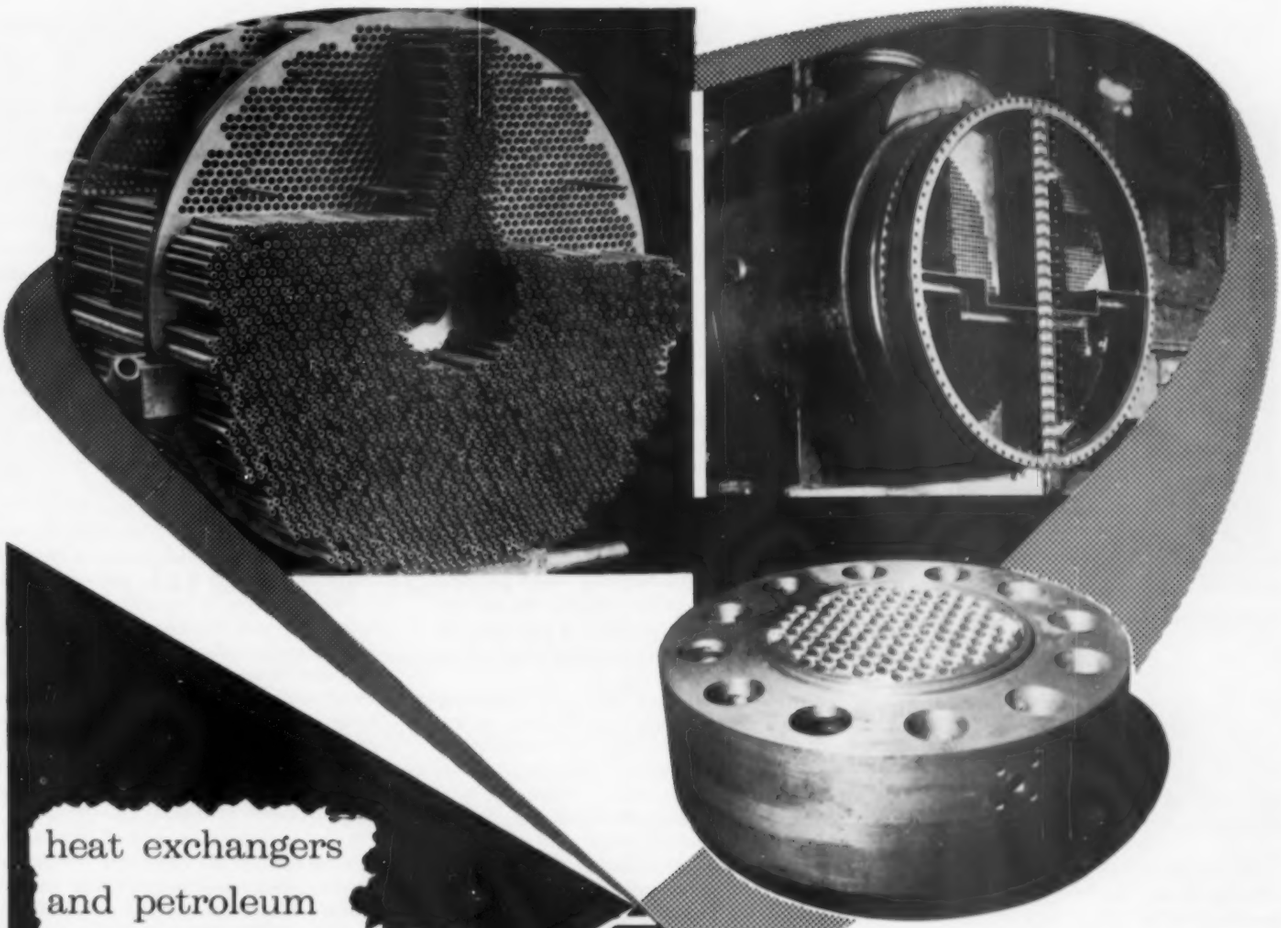

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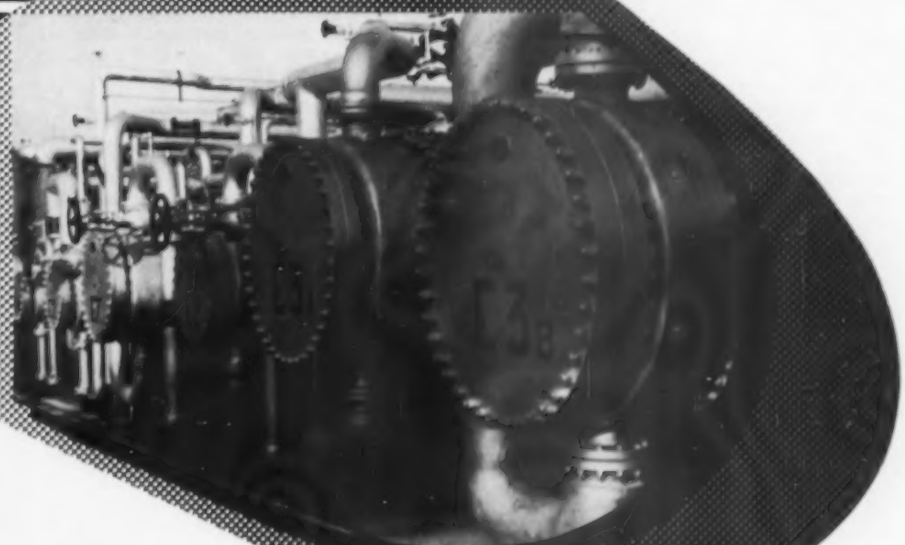


D. BONALDI & C.

CREMA (Italy)

Well in Camiri.

Latin America

(Continued from page 87)

tomites are exposed. International Petroleum is participating in a seismic survey and drilling plans on the Seaboard Oil concession in which it has a 50 percent share.

The Sechura desert area has seen 15 dry wildcats to date and there remain 10 companies holding about four million acres under concession. Results have been disappointing because wells, which all hit basement, proved a relatively small sedimentary thickness and a reduced development of the Eocene beds which yield the oil in the producing fields. The upper Tertiary strata, which show more fully developed marine deposits, have not proved productive so far. The most active drillers to date has been Union Oil (now withdrawn), with seven holes in the north; International, with six in the middle, north and south; and Richmond Oil Co., with two wells in the southern and central sections.

Much exploratory interest is now concentrated on the eastern Amazon basin where legislation in July authorized holdings larger than the 2.471 million acre limit, subject to auction and cash bonus. About 25 million acres have been applied for, principally by Texas Petroleum Co., Socony Vacuum Oil Development Co., Richmond Oil Co., International Petroleum Co. and Peruvian Gulf Oil. Six other American companies, one Canadian, one German and two Peruvian companies are represented with smaller holdings.

Interest centered originally on the upper Maranon basin due to Texas Company's projected pipe line to the Pacific from Borja on the Maranon. Later it expanded to the south through the Ucayali basin, and in June 1955 International Petroleum applied for 2.471 million acres down to Pebas below Iquitos.

The most active company is Texas, with five barges and tugs conducting seismic surveys. On June 12, Texas spudded its first well at San Lorenzo near Barranca on the southern bank of the Maranon river, which in July was down to 5,000 feet.

Peruvian El Oriente Co. has drilled two dry wildcats in Canchahuayo east of the Ucayali River and on the Pisqui anticline and is spudding a new well east of Contamana in the middle Ucayali in a joint venture with some German companies.

Ganso Azul drilled a wildcat on the lower Chonta structure in Ganso Azul's field, but abandoned it as dry at 2,197 feet. The original discovery well for the field, drilled in 1938, was deepened to 5,219 feet and struck granite. A new wildcat has been spudded by the company on the Santa Clara dome about 150 miles north of the Ganso Azul field.

Bolivia—Crude production almost tripled in 1954 to 4,500 b/d, up 282 percent from 1953. In 1955 the increase continued and output in the first five months was up 36.3 percent to 6,334 b/d, reaching around 7,400 b/d in May with a potential productive capacity of 10,000 b/d.

The sharp rise was due to the discovery of two deeper Devonian horizons in the Camiri field below the Sararenda overthrust—the Sararenda sandstone of about 100 feet thickness and its repetition by a second overthrust in the Santa Anita sandstone farther below. While yield of the upper sandstones, exploited in the past, does not exceed an average of 90-100 b/d, the wells in the Sararenda sandstone, averaging about 3,500-4,000 feet depth, yielded 500-600 b/d of 54° API crude, containing 60 percent of gasoline. The biggest well, C-80, drilled to the Santa Anita sandstone, yielded 920 b/d of 56° API.

The high grade of the Camiri crude is caused by the tectonic pressure of the overthrusts, which squeezed the oil from the source bed of the underlying (Devonian) Monos shales and submitted it to a natural distillation.

Output of the Camiri field, where at the end of the year 32 wells were in production, 22 of them flowing and seven shut in, amounted to 4,304 b/d in 1954, 92.7 percent of total Bolivian production.

Through the new pipe line from Camiri to Yacuiba on the Argentine frontier and railhead of the Argentine railways, 24° API crude is transported to Argentina and deliveries will amount to 5,000 b/d from the beginning of next year.

Because of the steep escarpments of the Camiri ridge, directional drilling has been started with the assistance of Eastman Oil-well Survey of Denver, Colo., spudding an average of five wells from the same platform, and the first directed well with a maximum inclination of 35° was completed to 3,913 feet depth and an initial production of around 550 b/d.

At the beginning of 1955 two other discoveries increased Bolivia's potential substantially. In the Guairuy field 15 miles south of Camiri, at around 1,800 foot depth and about 200 feet below the producing Sararenda sandstone which yielded 600 b/d in the test, the Guairuy sand was struck with a yield of 300 b/d of 61° API crude, containing 73 percent of gasoline. Below another overthrust, new oilbearing sands were discovered with an additional potential of 200 b/d.

In the Bermejo field on the Argentine frontier, the Toro well on the Toro dome, about eight miles north of the Bermejo wells, struck 450 b/d at around 2,640 feet depth in the Permian Tarija formation.

In Sanandita field, about 125 miles south, oil is recovered from sands in two principal horizons of the glacial Tarija formation of Permian age. The upper horizon at 1,312-1,640 foot depth yields 30-32° API crude, and the lower at 1,968-2,296 foot depth produces crude of 42-44° API. The overlying escarpment sandstones and San Telmo beds of the upper, probably Triassic, Gondwana sequence, are overridden on the Aguarague overthrust by the Tarija formation from the west. Below a second deeper overthrust one well reached the lower block and has yielded about 460,000 barrels from the Tupambi sandstones of the lower Gondwana section using new rotary rigs recently acquired. Exploration of the Devonian of this lower block is planned to increase the Sanandita field's output, which amounts only to about 150 b/d from 11 depleted wells.

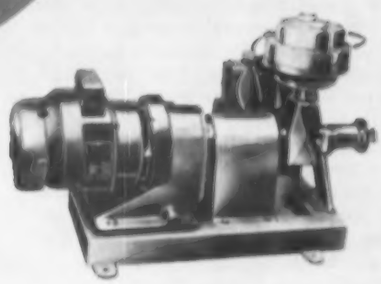
In the southernmost field of Bolivia, the Bermejo field on the Argentine frontier, an anticline of Cretaceous sandstones extends in N-25° E direction for 12.4 miles, divided by the varying inclination of the crest into three domes. In the center of the two northern domes the Permian Tarija formation is outcropping. The anticline is, as generally in the Bolivian sub-Andean zone, assymmetrical and cut by an overthrust on the western flank. Oil production proceeds from sand intercalations in three horizons of the Tarija formation and amounted in 1954 to 208 b/d from six old wells. One of the former wells, which reached the underlying Tupambi sandstones of the lower Gondwana, yielded nearly 1,370 b/d or 500,000 barrels. New drilling is therefore directed

(*Concluded on page 116*)

New pipe line from Camiri to Yacuiba and Argentina.

Solenoid-operated plunger pump with variable stroke and speed.

Single-stage gas pump with polytetrafluoro-ethylene diaphragm.



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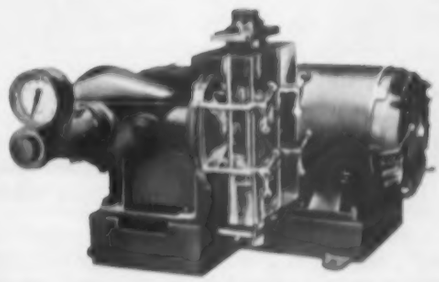
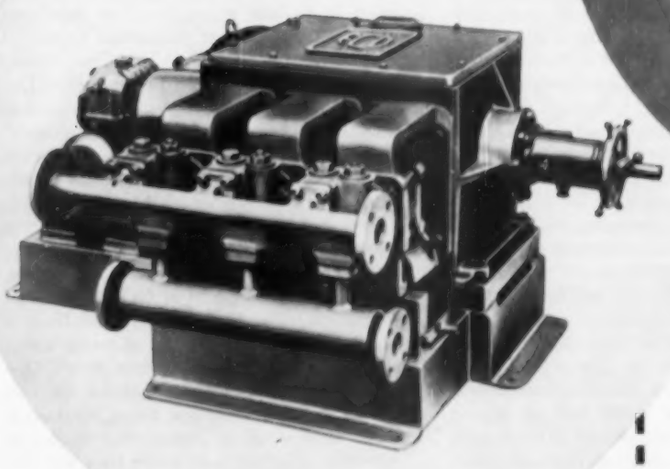


Diaphragm pump micro-capacity control with dial-type stroke adjustment indicator.



Treble plunger pump with micro-variable volume control.

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to the development of the Tupambi sandstones. The recent oil strike on the second Toro dome, also in the Tarija, has been mentioned above.

Grade of the crude of the Bermejo field is only 28-29° API. Oil in the Permian Tarija formation is always of lower grade, having lost probably by migration a part of its volatile content.

Exploration is planned by YPFB on the Itapirenda structure between Camiri and Guairuy and in Mancorainza, between Bermejo and Yacuiba.

At the McCarthy wells, the only foreign concession, operations showed little progress. Three wells have been drilled on the crest of the Monos anticline. Well No. 1 to 3,459 foot depth struck about one million cubic feet of gas. The second well nearby struck oil of 46° API at 3,140 feet, yielding about 100 b/d and is shut in. The third well, to around 3,800 feet depth, got the scraper stuck at shallow depth.

By a new financial agreement with Keljikan Commercial Corp. of New York, which took a 50 percent interest for advancing a total of U.S. $2,500,000, development will be stepped up.

Extensive pipe line development is planned. The new 6⅝-inch pipe line, 158 miles long, to the south of Argentina has been completed for a capacity of up to 18,000 b/d, and its continuation in Argentina to Embarcacion is underway. To the north, Camiri is connected by a 332-mile long pipe line with the 6,000 b/d Cochabamba refinery, and a 44-mile branch connects with the 4,000 b/d Sucre refinery.

A 6⅝-inch pipe line 231 miles in length from Cochabamba to Oruro and La Paz being built by Williams Brothers of Tulsa, Okla., is scheduled for completion in 1956. A 10¾-inch pipe line from Sica-Sica on the Oruro-LaPaz branch to Charana on the Chilean border, 175 miles long, and its continuation by a 44-mile 8⅝-inch line, for the descent to the free port of Arica in Chile, has been contracted with Williams Brothers for completion in 1957. It will transport 50,000 b/d to the Pacific at a total cost of around $18 million. The fall of the oil on the sharp descent to the Pacific will be employed, according to a project of Williams Brothers, for generating electric power.

In Argentina a pipe line about 800 miles in length is projected for the development of the Madrejones area on the Bolivian border to Rosario, second port of Argentina north of Buenos Aires. This will provide a Bolivian outlet to the Atlantic.

A new petroleum law has been proposed to facilitate the entry of private capital and may be passed this year.

Chile—Development of the Magellan fields, operated by Empresa Nacional del Petroleo, has continued. Crude production increased 38 percent in 1954 to about 4,800 b/d and reached 7,040 b/d in the first half of 1955. In 1954, from a total of 40 wells drilled, 14 yielded oil, four gas and 22 remained dry. In the first six months of 1955, from a total of 28 wells drilled, 13 wells have produced oil, two gas and 13 were dry.

The developed area was further extended to the southeast by the discovery of the Cullen and Flamenco pools and by the Primavera pool east of the Chillan pool, opened in the preceding year.

The Victoria pool was also enlarged by new discoveries to the east and west. Nineteen oil and gas pools have been located so far, but 85 percent of the production proceeds from Manantiales, Victoria Sur and Sombrero pools. Through June 30, 1955 a total of 190 wells has been drilled, of which 81 produced oil, 31 gas and 78 were dry. Thirty-five wells were in production at the end of 1954, yielding an average of about 200 b/d per well of 41-42° API crude.

In the Magellan basin, sedimentary thickness of the Cretaceous and Tertiary marine deposits exceeds 35,000 feet. The oil is found at 7,200-7,600 feet depth in the Springhill sand of 35 to 100 feet thickness, overlying the "serie tobifera" of ashes and porphyries of possibly Triassic age, which in one well has a thickness of over 3,000 feet. Trend of the structures is NW-SE, crossing to the east to the Argentine side of Tierra del Fuego, where oil has also been found by YPF, the Argentine government agency.

Outlook for finding other oil accumulations in this big basin is promising, but wildcats on the continent to the west and northwest, drilled to 10,000 feet depth, have remained so far in the Tertiary section and yielded only gas. A wildcat, drilled last year to 7,169 feet at Miraflores in the southwestern part of the island of Tierra del Fuego itself, was dry.

Chile's domestic demand is estimated at 26,000 b/d. The Concon refinery, put in operation at the end of last year, has a capacity of 20,000 b/d, of which around a third is supplied by domestic production and the balance provided by an import contract with Esso from Venezuela.

In order to accelerate the development of the petroleum industry, the government introduced a bill during 1954 to modify the State monopoly held by Empresa Nacional del Petroleo (ENAP). The bill would have permitted operations under 30-year contract to ENAP with a royalty of 20 percent. The most favorable area, the Magellan territory, remained under exclusive reservation to the government through ENAP.

The original draft of the bill was withdrawn from Congressional consideration during early 1955 for revision. As of early August, there appeared to be a favorable climate of opinion concerning the admission of foreign capital to petroleum operations, and this was further supported officially by a recommendation for the bill by the President of Chile in a recent speech.

Barbados—Barbados Gulf Oil Co. abandoned Adams Castle No. 1 at a total depth of 5,596 feet in March 1955. The company is now drilling below 10,000 feet on Spring Vale No. 1 in the central part of the island.

British Honduras—British Honduras Gulf Oil Co. spudded Yalbac No. 1 on June 20, 1955. This is the first wildcat well to be drilled in British Honduras, the entire area of which (8,598 square miles) is held by British Honduras Gulf Oil Co. under petroleum rights originally dated 1949.

Cuba—Since the discovery in May 1954 by Kerr-McGee of the Jatibonico well, Cuban exploration activity continues to increase, with six rotary wildcats drilling or testing; 12 cable tool wildcats drilling; five rotary wildcat locations planned to start within 30 days; and two seismograph and two gravity meter crews currently working. Operations cover every province.

Trans-Cuba Oil Company's Sancti Spiritus No. 1, Las Villas Province, central Cuba, was drilling at 9,280 feet on August 1 in sandy lime. Cuba's deepest land test to date, this well confirms the discovery of a deep Tertiary basin. Trans-Cuba plans to continue drilling to the Cretaceous.

Cuban Sulgraves Oil Co., drilling on the Zapata Peninsula in Las Villas Province, completed a difficult fishing job and is drilling ahead from 1,705 feet with a reported show of oil in the Miocene. This well is planned as a 10,000-foot test.

Cuban Kewanee Oil Co. bottomed its deep test at 7,285 feet in the Jarahueca oil field in Las Villas Province and set pipe and perforated the 4,150-4,165-foot zone without obtaining production. Shallower zones will be tested. Kewanee is drilling a shallow test in the field.

Union Petrolera Aurrera-Jarahueca is testing a reported 160-foot sand section in its 1,600-foot wildcat at Esperanza in Las Villas Province.

Trans-Cuba plans another test in the vicinity of its Sancti Spiritus No. 1. Cuban American Oil Co. plans its second wildcat in the Jatibonico basin and has just completed a detailed seismograph survey. Siboney Exploration and Drilling Co. (Sterling Oil Co. and Crescent Petroleum Corp.) plans its first 5,000-foot wildcat on the southern coast in Camaguey Province. Americuba Petroleum Corp. plans a 4,000-foot test near Santa Clara in Las Villas Province and a 3,000-foot test in the Jarahueca oil field.

Development drilling in the Jatibonico oil field in Las Villas Province has been stopped, with current production estimated at approximately 1,000 b/d. Cuban Canadian Oil Co. (American Leduc) plans five more wells and Union Petrolera Aurrera-Jarahueca plans two or three additional wells. The Jatibonico field has contributed a great deal to Cuba's production which during 1954 was only about 200 b/d.

Trinidad—A typical Trinidad producing well has resulted from the offshore drilling operation of Trinidad Northern Areas Ltd. in the Gulf of Paria between Trinidad and Venezuela. The well was drilled from a platform erected in 40 feet of water about six miles northwest of Cedros Point. Operators have not finally completed the well as yet. Various tests are being conducted. It is classed as a commercial producer, however. Whether production from the find will be enough to pay for extensive marine drilling must be determined by step outs.

PETROLEUM CHEMICALS DIVISION
NEWS

September ★ One of a Series of Interest to the Petroleum Industry ★ 1955

Fast-rolling "MAGIC BARREL" now smaller, lighter

As a public relations tool for individual refiners and the petroleum industry, the "Magic Barrel" shows steadily increasing value.

In the first quarter of 1955, more than twice as many "Magic Barrel" presentations were made as were made in the same period of 1954. In March alone, an audience of 66,789 witnessed the presentation.

Now to make it more convenient for speakers who make the presentation, a smaller, lighter barrel is available.

The number of shelves has been cut from 16 to 9. This has been done without sacrificing any props or audience interest. As a further convenience, the new barrel can be divided into two units. A performance can be made with each half.

Created originally by the Du Pont Petroleum Chemicals Division for Oil Progress Week observances, arrangements for "Magic Barrel" presentations are now handled by the OIIC.

ASHLESS additive to help you curb oil burner ignition failures

You can now use a single additive to do two important jobs.

As a stabilizer and dispersant, Du Pont Fuel Oil Additive No. 2 does a highly efficient job of preventing sludge formations that cause filter fouling and nozzle plugging.

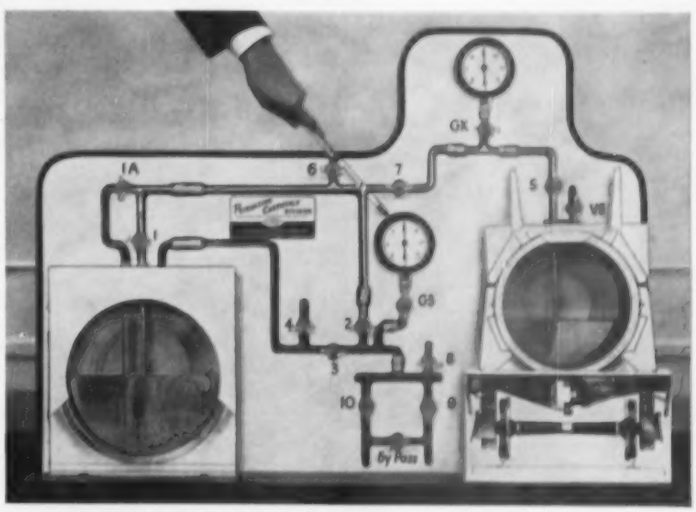
In addition, it offers an important plus value by minimizing ignition failures. How?

Being a nonmetallic *ashless* additive, it does not leave a metallic ash deposit which can foul the operation of the electrical system. Thus it helps to *eliminate many of the service calls* that cost your distributors time and money . . . and even loss of business through customer dissatisfaction.

Added to freshly prepared stocks at the refinery, FOA-2 retards the formation of insoluble residues during storage . . . keeps oil free flowing and clean burning . . . helps clean out sludge deposits that clog burner filters, screens and nozzles.

Many Du Pont contributions to safer, more efficient, TEL handling

Because the handling of tetraethyl lead is such a critical job, developing ways to do it safely and efficiently is a constant challenge. One of the main purposes of the Du Pont Petroleum Chemicals Division's operations group is to help refiners in this important work.



THIS HYDRAULIC WORKING MODEL exactly simulates with mercury the operation of a TEL eductor system . . . makes an ideal tool for training blending plant personnel.

By approaching the problem from different angles, Du Pont has been able to make a number of valuable contributions. One of these is . . .

New gage adaptation

Failure of the gage used in checking eductor efficiency during TEL blending is frequently costly to refiners in lost time and wasted manpower, as well as in the actual cost of repairs. This gage failure has often occurred when excessive pressure at shutdown or startup strains the gage, rendering it inaccurate or inoperable.

To correct this problem, we are providing a new type of gage that resists pressure damage. Its indicator needle is controlled by a grooved shaft. When the pressure limit—maximum pressure indicated on dial face—is reached, the needle and shaft disengage. When pressure drops, they automatically link together again—without damage to accuracy.

Large numerals on the gage face make it easy for operators to read pressures accurately within relatively close tolerances over the full range, both positive and negative.

Model helps in teaching

Another recent development of the operations group is a unique model of a blending plant which can be used as a working, visual training aid. Vacuum operated, it simulates actual blending plant operations. By presenting the

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OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED

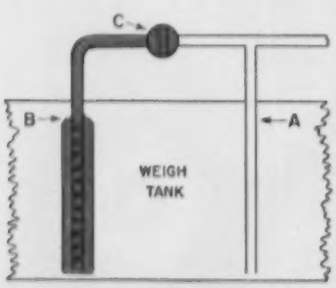
TEL Services

system as two simple mechanical functions – unloading and blending – it makes an ideal tool for giving new employees a graphic understanding of TEL handling operations. It can be used to demonstrate safety procedures and establish standard handling methods. And large groups can receive identical instructions at a single sitting.

Siphon problem ended

Until about a year ago, siphon breaks caused by leaks in the vacuum system often posed a serious TEL unloading problem for refiners. Then a Du Pont engineer in the operations group came up with the solution . . . and a special pipe that acts as a siphon starter was made available to refiners.

The Du Pont-designed siphon starter is entirely confined within the weigh tank. And the starter itself is surrounded by a perforated outer shield which eliminates any danger of explosion from a static charge.



THIS DIAGRAM EXPLAINS the basic principles in the Du Pont siphon starter system. "A" represents the standard standpipe. "B" indicates the perforated standpipe and shield. "C" is the siphon starter valve.

Metal-Flex hose

Still another Du Pont contribution to TEL unloading efficiency was the development of the Metal-Flex TEL unloading line. Because it is flexible, it does away with packing glands which sometimes result in leaks on other types of lines. The Metal-Flex hose requires only one man to hook up and operate.

Continued—middle of next column

Du Pont Metal Deactivator Now Approved for Use in Military Jet Fuels

A military specification, MIL-F-5624C, has been issued approving the use of metal deactivators in military aviation jet fuels. Du Pont Metal Deactivator, "DMD," complies with this specification.

In this new use, DMD protects against the harmful effects of active copper and other metallic compounds which have a detrimental effect on jet fuel stability. Its use is especially important for stockpiling and overseas operations where the storage periods and distribution lines are extra long.

Another important advantage of using DMD is the greater blending flexibility it provides. In this way, it increases substantially the availability of blending stocks that can be used for military jet fuels.

The government specification permits the use of a maximum of 2 pounds of active ingredient of metal deactivator per 1,000 barrels of jet fuel. Methods of addition and other information on the use of DMD are included in the recently published Du Pont Metal Deactivator book. If you do not have a copy, ask any of our representatives or regional offices to send you one.

Your special problems

Although we are not in the equipment design business, our operations group is always ready to help you with your individual TEL handling problems, *whatever* they are. And the above improvements are a result of this service, which also includes engineering help with blending plant design and construction—all the way from site selection to personnel training.

To help US . . .

continue to develop improvements in TEL handling, please tell us your problems. Just address your request for service to any of our representatives or regional offices listed below.

WEST COAST LAB MANAGER

JAY BRENT MALIN

A background as internal combustion engine specialist, work in rocket motor development, and engine research and development for The Texas Company qualifies J. Brent Malin for his current assignment. He is manager of the Petroleum Chemicals Division's Regional Laboratory at El Monte, California. Previous to this, he was a technical representative in the West Coast area.

Mr. Malin joined the Du Pont Company in 1951 as an automotive technologist. In that capacity he devoted much time to assisting oil companies in solving product use problems. With automobile manufacturers, he worked on engine developments related to fuel and lubricants.

Malin came to Du Pont from North American Aviation. Prior to that time, he had been with The Texas Company for ten years.

He was graduated from the University of Utah with a B.S. degree in mechanical engineering. He is a member of SAE and a Registered Professional Engineer, State of California.

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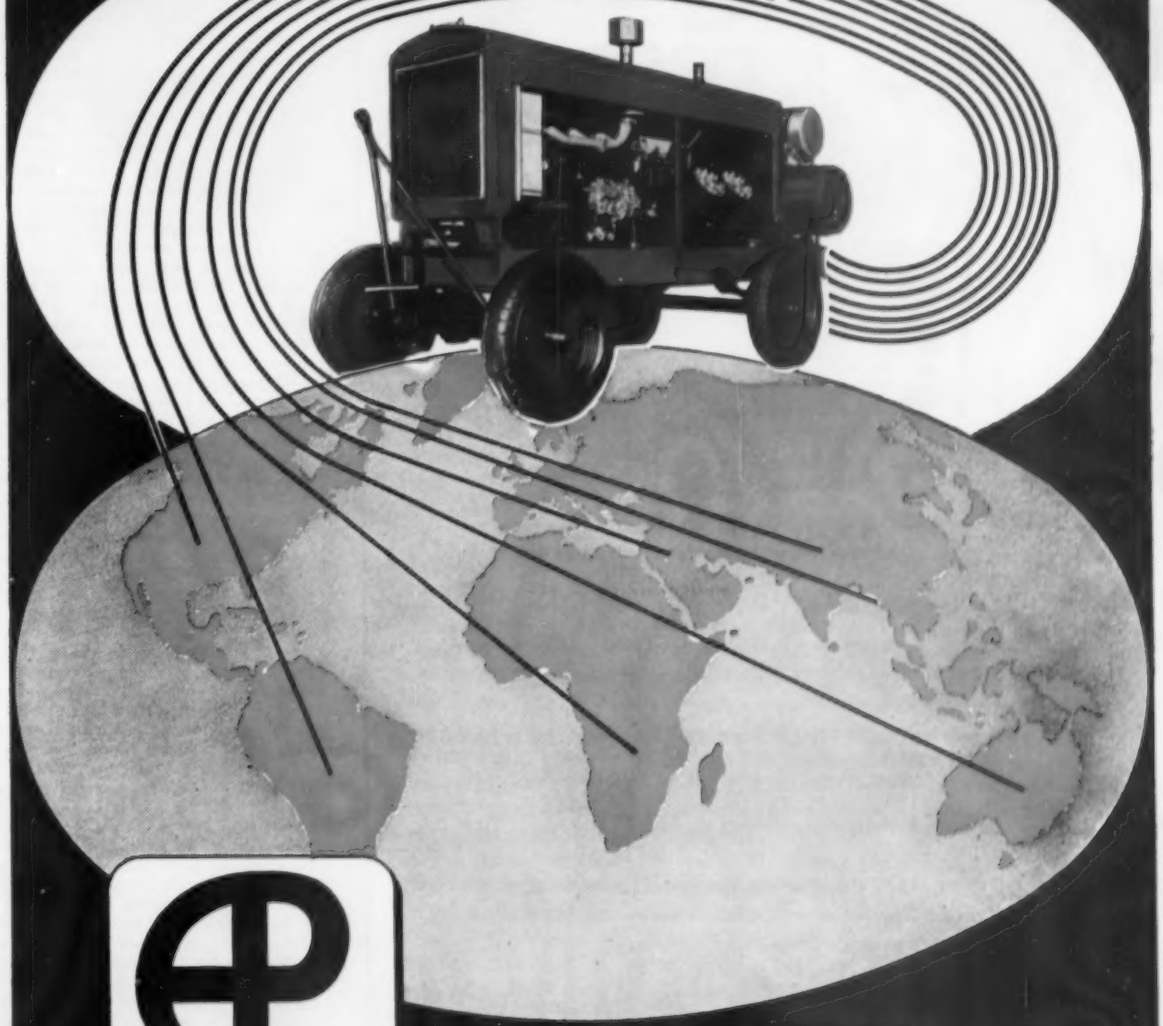

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New Guatemala Law

(*Continued from page 68*)

the minister takes the matter under advisement. If no solution can be reached the area is put up for competitive bidding. The same competitive bidding applies to areas of concessions surrendered, cancelled, annulled or expired, except in the latter case the original holder has preference.

The fiscal obligations to which the exploitation concessionaire is subject are simple. Complete exemption from import duties is given on materials and supplies for operations. Although all general taxes apply, there are none which would affect operations since no income would be expected during this period.

An annual surface tax is imposed of 12.14 cents per acre for the first three years, 18.21 cents per acre annually during the fourth through the sixth years and 24.28 cents thereafter, if extensions are given. From this, royalty paid (if any) is deductible and exploration and development expenses before are deductible as well, up to 75 percent of the tax.

Instead of a drilling obligation, a minimum investment in direct exploration is required. This amounts to 36.4 cents per acre for the entire first three-year period, 42.49 cents per acre for the fourth through sixth year period, and 16.18 cents per acre thereafter. On a concession area of maximum size it would be $359,777 for the first three years, and $419,971 on the next three for a total of $779,748 over six years. This is, of course, probably less than the cost of one well in the Peten region.

In the event of commercial discovery, an extra extension of five years may be added to the exploration concession. This is designed to permit the holder to define the limits of the field and select the areas desired for an exploitation concession.

The exploitation concession is automatically granted to the holder of an exploration concession who makes a discovery. One of the points in dispute during formation of the law was the original obligation for a discovery before an exploitation concession could be granted. In the final law no discovery is necessary, but a drilling obligation within six months is then imposed and production must begin within six months.

The area of the exploitation concession is set at 50 percent of the exploration concession, for a maximum of 61,775 acres. A single person or corporation is limited to a total of 494,200 acres, contained in one to ten concessions. An equal amount must be set aside out of the exploration concession for competitive bidding, and on this area Guatemalans have first choice, otherwise it is given to the highest foreign bidder.

The duration of each concession is set at 40 years, with one extension possible of 20 years additional, subject to the laws then in force. Petroleum demand within Guatemala, including the military and bunkers, must be satisfied before production may be exported. These internal sales are to be at the free market price, and there is no control over export prices.

The fiscal obligation of the concession calls for a 50-50 split of profits before foreign taxes. This is an advanced concept for an unproved area, but it is lessened by the deductions and depletion allowance which permit recovery of expenditures on exploration, dry holes and other development costs prior to production.

The most important levy is the income tax, which in Guatemala ranges from five percent on $500 to 43 percent on net income over $300,000. After this and other Guatemalan taxes are paid, there is levied a special surtax, if necessary, to bring the total level of taxes to 50 percent of net income after deductions.

In addition there is a surface tax on exploitation concessions payable annually which begins at 60.7 cents per acre during the first five years, rising to $1.21 cents per acre in the sixth through the tenth year, and to $2.42 cents per acre in the eleventh through the fifteenth years. In following years the tax is $1.82 per acre. This amounts to a total of $299,979 on the maximum concession area in the first five years, rising to $1,959,640 in the eleventh through the fifteenth years. The amount of royalty is deductible from this tax, as are the costs of exploration and development before discovery, up to a maximum of 75 percent of the surface tax.

Royalty is 12½ percent of net production, minus field use and production returned to formation. Of this 12½ percent, four percent is paid by the State to the private owner of the land, if any. The royalty is payable either in kind or in cash at "world market" prices, at the government's option. The royalty and surface tax are both payable no matter what the level of operations. For this reason they are the minimum which must be paid, even if a loss were suffered on total operations.

The deductions which are given enable the recovery of expenditures on exploration and development, as well as a depletion factor. They include deduction of development materials cost, amortization, depletion factor of 27½ percent of gross up to 50 percent of net and intangible drilling and development costs. There is also provision for the carrying forward of previous losses for ten years. As previously indicated, the cost of exploration and drilling may be applied up to 75 percent of the exploration surtax.

In view of the activity which was stimulated by the Peruvian petroleum law of 1952, it is interesting to compare Peru's law with Guatemala's. There are special terms available for the more difficult areas of the Montana and Amazon Basin of Peru, but the Coastal area is subject to exactly the same area limitations, both in exploration and exploitation. The minimum investment is about the same for both areas. Surface taxes and maximum concession areas are about the same during exploitation. During exploration Guatemala is higher with 24 cents per acre compared with 12 cents in Peru, but the duration of the concession is longer with 10 years, versus 5.

The largest difference occurs in the depletion allowances and in this regard Guatemala appears to be the more favorable area. In the coastal area of Peru the depletion allowance is limited to 15 percent of gross, up to 50 percent of net. The 50 percent limit is figured after deduction of the 20 percent export tax and the 15 percent depletion allowance. In Guatemala the depletion allowance is 27½ percent of gross up to 50 percent of net. Net is figured before deduction of the depletion allowance, which is more favorable to the operator.

NEW

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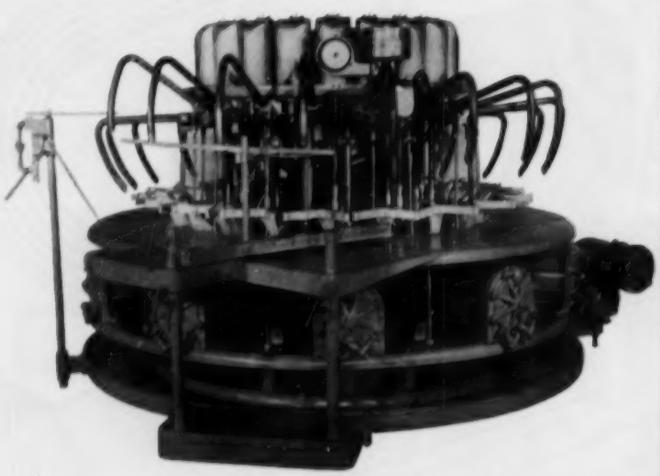

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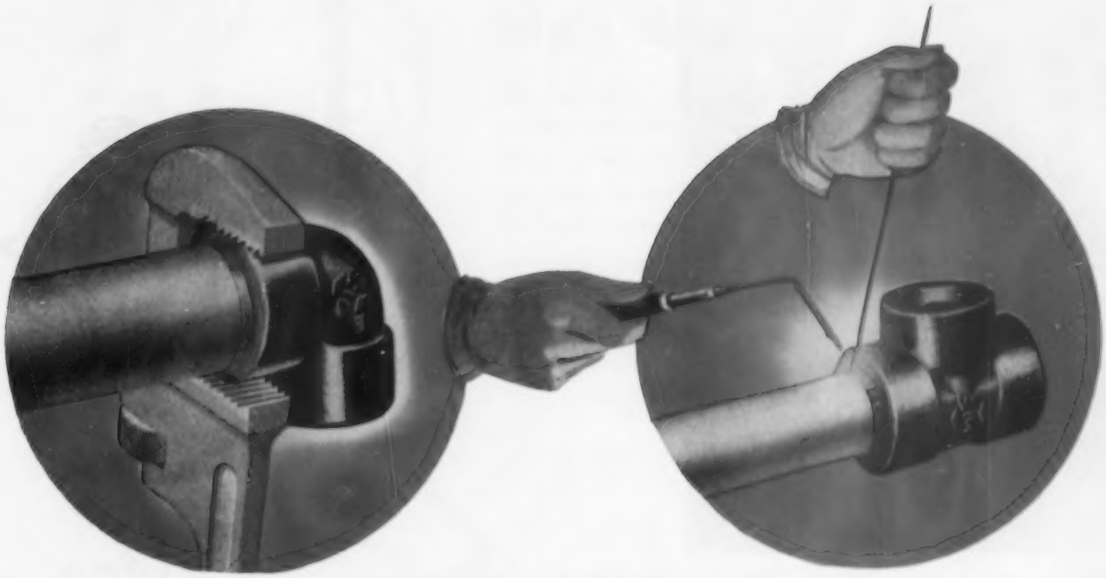

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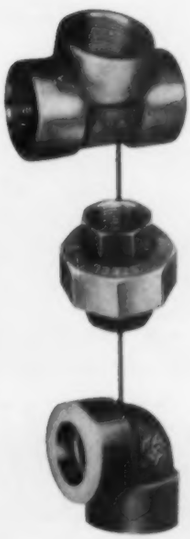

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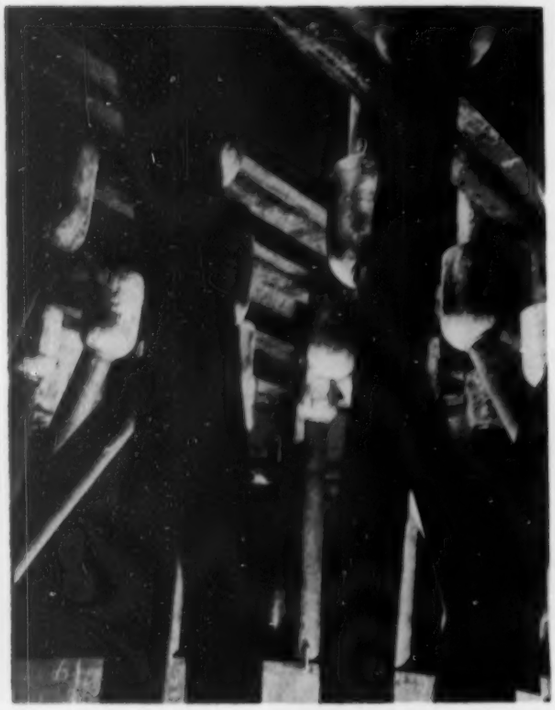

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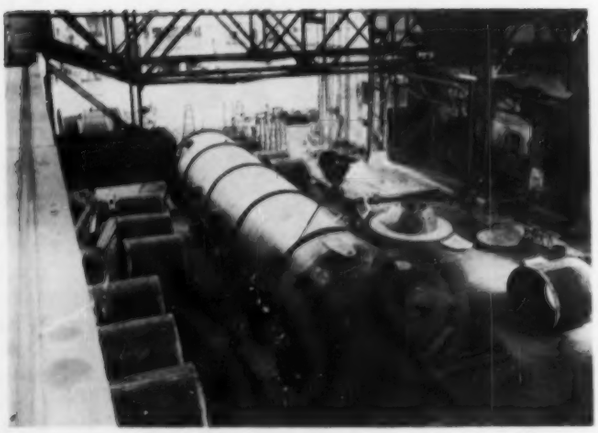

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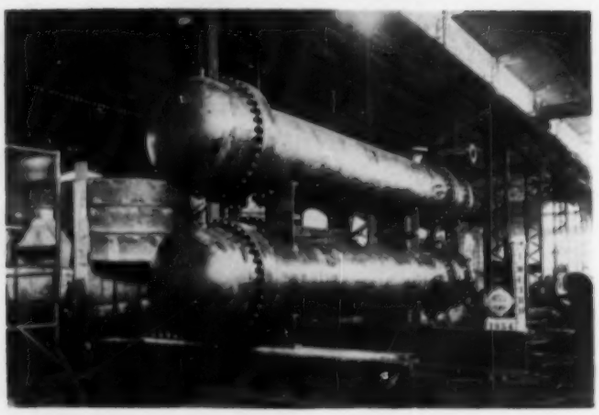

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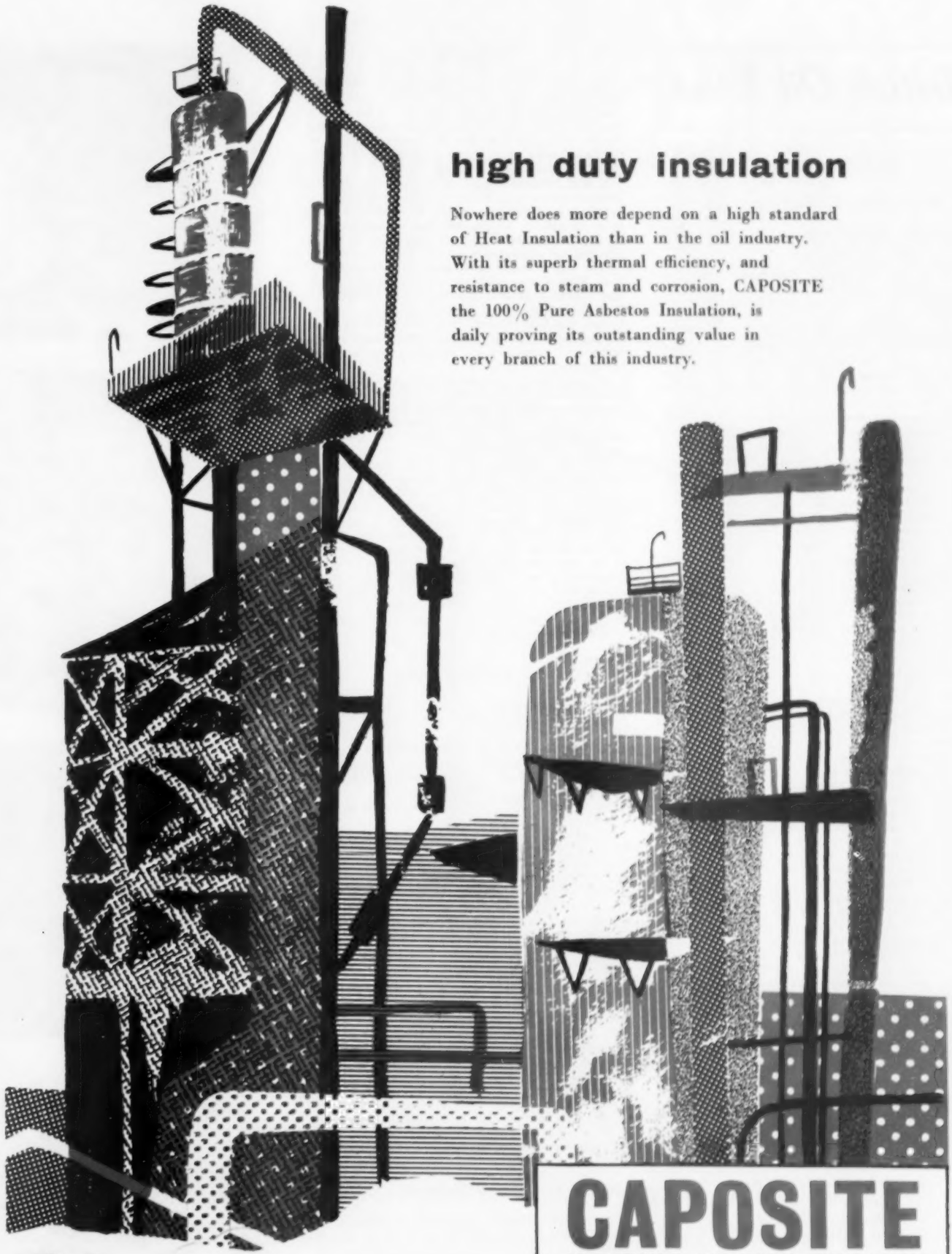

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British Oil News

By E. Lawson Lomax

Fuel in the United Kingdom

The recent announcement by the National Coal Board of large increases in the selling price of coal to cover past deficits and also to cover pending increases in cost of production, has raised a storm of protests by consumers of all classes in the country, but should have a beneficial effect on the country's petroleum industry.

That some increase was expected is shown by the steps that some of the major consumers have already taken to replace coal by fuel oil, i.e., by the British Electrical Authority to use fuel oil in some of the large power stations, by the Gas Authorities to use petroleum for the manufacture of town gas and by the trend towards dieselization of the railways, apart from increased use in industry in general.

It is doubtful, however, whether any of these consumers had envisaged the staggering increase in prices which has been announced, amounting as it does to about 18 percent.

Whether this increase in the price of basic fuel in an island which, geologically, is practically composed to a great extent by coal, is justifiable is not a subject for discussion in this journal, but its effect on the future consumption of oil is certainly of interest.

Actually this increase of price, based on the purely thermal values of fuel oil and coal, raises the value of the liquid fuel to the consumer by about £1 sterling per ton, and as such makes the policy of oil burning for the production of heat or power appear even more favorable than it has in the past, and in addition will enable the refiner to get a better return for his black oils that he has hitherto done, assisting him in carrying out his refinery program to a greater commercial advantage. It has been stated in the past that it is not practical for British refiners to produce a larger quantity of black fuel oils than they have been doing, as that would lead to increased production of light fuel oils for internal combustion engines, and that the market for these products is already saturated. But the refining industry is so flexible that these difficulties can be taken in its stride, providing always that it would be a profitable step to take.

Shell-Mex and B. P. Ltd. announced on July 20 that a contract had been signed with the Central Electricity Authority for the supply of oil fuel for 12 years to seven additional power stations and a projected power station to be built on the Thames Estuary. This contract allows for the eventual supply of three million tons of fuel oil per annum.

A novel feature of this contract provides for the use of low flash point fuel oil at two of the selected stations, but the announcement does not state how low this flash point will be. Its use will assist in rendering refinery operations more flexible.

The current production of fuel oil by Shell-Mex and B. P. amounts to the equivalent of about 7.75 million tons, and with the new contract the total saving of coal will be from 12 to 13 million tons.

It would appear, therefore, that this latest move of the National Coal Board would have no ill effect on the petroleum industry, unless the pundits seek to bolster the decaying coal industry by putting prohibitive tariffs on petroleum products, which in turn would have the effect of raising general production costs throughout industry and thus jeopardize the export trade on which the country depends for its welfare.

A New Railcar Service

In connection with British Railways' modernization program, a new diesel railcar service was inaugurated on July 25 between Watford and St. Albans. The trains for this service were supplied by British United Traction Ltd. Units of two power cars and one trailer will be used. Each power car is driven by a 125 bhp diesel engine developing a maximum speed of 1,800 rpm and driving through a 4-speed epicyclic gearbox.

Tanker News

The 18,000 dwt steam turbine tanker "Harpala," built to the order of Shell Tankers Ltd., was launched from the Belfast Shipyard of Harland & Wolff on July 6, 1955, the launching ceremony being performed by the Hon. Mrs. N. Ionides, daughter of the late Lord Bearsted, the first chairman of the "Shell" Transport and Trading Co. Ltd.

In 1890, Marcus Samuel, as he then was, made a business visit to Russia from whence he was already purchasing petroleum products in barrels. He was so impressed by the Caspian Sea oil tankers that he was convinced that the shipping of oil in packages was too expensive as well as being unwieldy.

As a result, he placed an order with Wm. Gray & Sons, West Hartlepool, for a 5,000 dwt tanker which was delivered in 1892 and eventually became the first Shell tanker. The naming ceremony for this tanker, the S.S. "Murex," was performed by Mrs. Marcus Samuel, and the Hon. Mrs. Ionides well remembers being present at that ceremony with her mother.

At that time the passage of such an inflammable cargo as oil through the Suez Canal was a subject for alarm and some persuasion was necessary to induce the canal authorities to allow it. At present, petroleum in some form or another constitutes 65 percent of the total traffic of the canal.

After the launching, J. W. Platt, chairman and managing director of Shell Tankers Ltd., spoke about tanker shipping in general, and urged British ship owners to give a thought to the prospects of this expanding and profitable business, in which at present they do not have a reasonable share. He said that his company had to give constant thought to the problems which arise out of the growing magnitude of its fleets. It is known that about eight million dwt of tanker shipping already on order has still to be delivered. The actual figure given in July issue of World Petroleum as of December 31, 1954 was equivalent to 9,726,330 dwt.

Personnel

Charles Howard, Wirral, Cheshire, has been appointed engineer commodore of the British Tanker Co's fleet as of July 1, 1955. After sea service as junior engineer officer, he joined the B.T.C. in 1922 and was promoted chief engineer in June 1935. He served at sea throughout the war in various tankers and in September 1952 was appointed one of the company's senior port chief engineers. He is now serving in M.V. "British Guide."

Newton Chambers & Co. Ltd., Thorncliffe, Near Sheffield, announce the pending retirement of Sir Harold West, managing director, to take place next year, when he will be succeeded in that post by P. J. C. Bovill, who has been appointed as of July 1 as assistant managing director and general manager of the chemicals division.

Sir Harold West was the youngest Sergeant-Major in the New Army in the first World War. He was commissioned and severely wounded in May 1916, and was senior technical assistant to the surveyor general of supply, war office, from 1917 to 1919. He joined Newton Chambers in 1919, became managing director in 1941 and vice-chairman in 1953.

In June 1948 he was knighted for industrial and educational services. He was master cutler of Sheffield 1952-53. He has taken an active part in many educational and industrial training organizations.

Col. H. T. Thornley, managing director of J. & H. McLaren Ltd., Leeds, a Brush Group subsidiary, relinquished that position on August 27 to join the staff at group headquarters in London, where he will be director of administration and supply.

"Shell" Refining & Marketing Co. Ltd.

The reconstitution of the board of directors of "Shell" Refining and Marketing Co. Ltd. is announced.

J. W. Platt will be the new chairman and E. Le Q. Herbert is appointed managing director. The other directors will be: J. A. Berriman, J. Grant, F. Mackley, C. R. Middleton, F. J. Stephens, R. W. J. Smith and W. S. Thompson.

"Shell" Refining and Marketing Co. Ltd. owns and operates refineries in the United Kingdom, the two most important of which are the Stanlow in Cheshire and Shell Haven in Essex.

Charles Howard

Sir Harold West

P. J. C. Bovill

Col. H. T. Thornley

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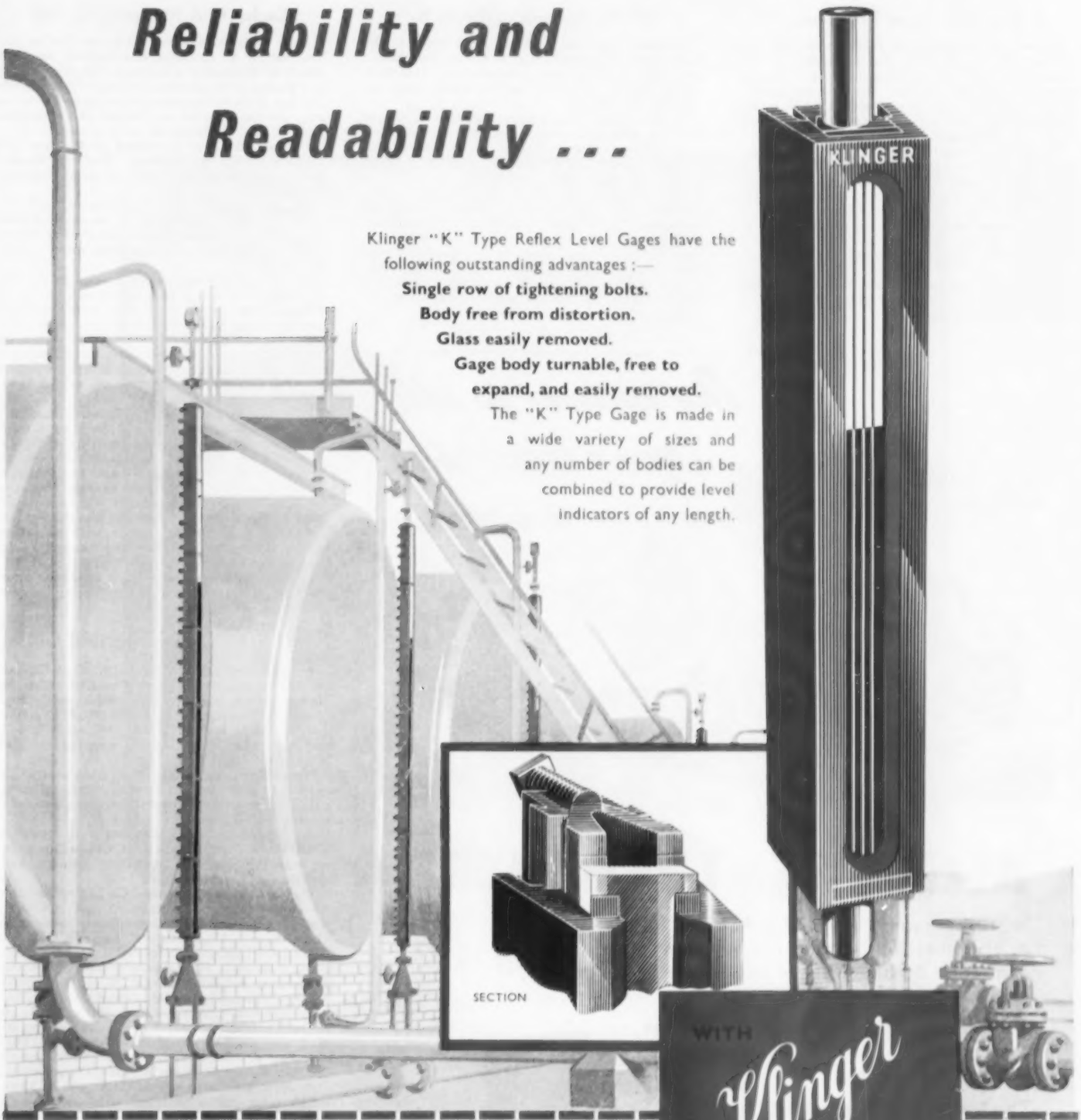

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More Gas From Petroleum

The Power-Gas Corp. Ltd., Stockton-on-Tees, announces that a plant for the production of 12.5 mmcf/d of 1,000 Btu gas from petroleum is being built at Silverwater, Sydney, Australia, for the Petroleum and Chemical Corp. (Australia) Ltd. by the associated company the Power-Gas Corp. (Australasia) Ltd., Melbourne, Victoria.

The factory comprises a gas making unit using the Semet-Solvay regenerative reverse flow type of plant, gas purification by dry and liquid processes, tar removal and treatment plants, the recovery and processing of by-products and the compression of gas for distant delivery. The gas will be piped through a 12-mile pipe line to Sydney and after dilution will be distributed through the city's service mains.

By-products will include tars, benzene, toluene, xylene and hydrogen sulfide. The cost of the project will be about £A2 million.

Oil Production in the U. K.

Another producing well has been added to the three already in production at British Petroleum's new oilfield at Plungar, Leicestershire. This well, No. 12, struck oil at 3,151 feet. Work has started on drilling Well No. 13.

At Egmanton, Notts., where a good show of oil was found at 3,200 feet, a second well is being drilled.

A shallow well to provide geological information is being drilled in a new location at North Fordon, Near Scarborough, Yorkshire.

A second deep well is being sunk by D'Arcy Exploration Co. Ltd. near Crowborough, Sussex as part of the Gas Council's five-year search for natural gas in the U.K. Its site is about on mile southeast of the first well sunk in the district, which went to about 4,500 feet and revealed small shows of gas at several levels. These results and subsequent seismic surveys justified the sinking of the second well.

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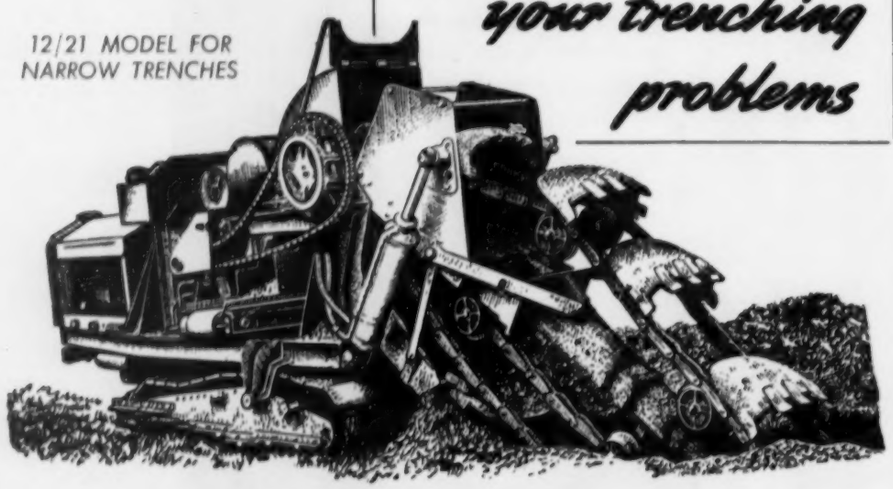

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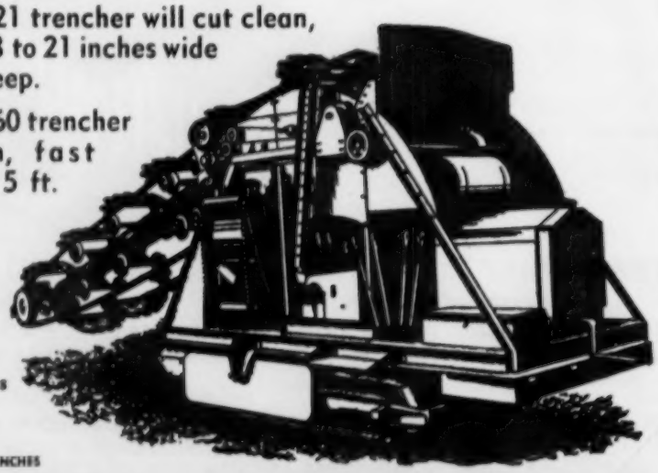

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Eagle Oil & Shipping Co. Ltd.

Eagle Fleet, the story of the tanker fleet in peace and war by W. E. Lucas, has recently been published by Weidenfeld & Nicolson, Ltd. London. This is a history of the fleet of the Eagle Oil & Shipping Co. Ltd. from its inception to the present date, and may also be regarded as a history of the development of tankers during the present century.

The company was developed by the first Lord Cowdray, when he was Sir Weetman Pearson, shortly after he built his first refinery at Minatitlan, Mexico.

The first tankers, the "San Cristobal" and "San Bernardo," were destined for the transport of products from this refinery around the Gulf of Mexico, but as the fleet grew, its operations were extended worldwide.

The writer is particularly interested in the "San Cristobal." She was a 3,000 dwt vessel, and as Sir Weetman was not in favor of a vessel making a non-profitable voyage, he had her loaded with 750,-000 bricks for use in the refinery at Minatitlan. The writer had the job of supervising the unloading of these bricks, cleaning the tanks and then loading her with the first cargo of Mexican oil carried by an Eagle ship.

From that time the fleet continued to grow. The earlier 9,000 dwt ships were coal fired, but a major innovation was made in 1913, when the 15,700 dwt oil-fired "San Fraterno" was launched from the yards of Swan, Hunter and Wigham-Richardson, at Wallsend on Tyne, being at the time the largest oil vessel in the world. This vessel was undoubtedly the forerunner of the present day supertanker now running up to 47,000 dwt capacity, with the modern utility tanker of 16-18,000 dwt capacity being roughly the same as the world's largest in 1913.

The book is fascinating reading to anyone interested in the oil industry or in the shipping industry.

New U. K. Petrochemical Co.

A new company called Shell Chemical Co. Ltd., which has an authorized capital of £10 million, has been formed to take over the activities of the Shell Chemical Manufacturing Co. Ltd., Shell Chemicals Ltd. and Petrochemicals Ltd., the latter being a company which was recently acquired by Shell Chemicals Ltd.

These activities include the manufacture and marketing of detergents, solvents, resins, agricultural products and chemical intermediates derived in the main from petroleum.

Petrochemicals Ltd., while being a wholly owned subsidiary of Shell Chemical Co. Ltd., will continue its manufacturing and marketing activities as a separate entity.

The board of Shell Chemical Co. Ltd. will be constituted as follows: chairman, F. A. C. Guepin, a managing director of the Royal Dutch/Shell group; vice-chairman, W. F. Mitchell, former manager of Chemical Industry Administration (C.I.A.); managing director, L. H. Williams; commercial director and deputy managing director, G. H. W. Cullinan, previously general manager of Shell Chemicals Ltd; and executive director, manufacturing, E. Le Q. Herbert, managing director of "Shell" Refining and Marketing Co. Ltd. Directors will be: J. W. Platt, chairman of "Shell" Refining and Marketing Co. Ltd.; Sir Robert Robinson, director, Petrochemicals Ltd.; A. D. Koeleman, officer, C.I.A.; and F. Mackley, director, "Shell" Refining and Marketing Co. Ltd.

Television on Coastal Tankers.

Fourteen vessels of the coastal tanker fleet of Shell-Mex and B.P. Ltd. are being fitted with 17-inch screen, 13-channel TV sets by Pye Marine Ltd.

Furness Shipbuilding Co. Ltd. announce that the 17,475 dwt single screw motor tank vessel "Southern Satellite," built at their Haverton Hill shipyard to the order of Messrs. Chr. Salvesen of Leith, successfully passed her seagoing trials and was subsequently handed over to her owners.

The Fairfield Shipbuilding & Engineering Co. announce that the 16,000 dwt tanker "Border Laird," built by them to the order of the Lowland Tanker Co. in which British Petroleum Co. Ltd. has a 50 percent interest, was launched from their Clydeside yard on July 1, 1955, the ceremony being performed by Lady McEwen, wife of Sir John McEwen.

THE STEEL TUBE AGE

S & L steel pipelines, 14 in. and 16 in. outside diameter,

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The pipes and fittings are being butt-welded together (see section below).

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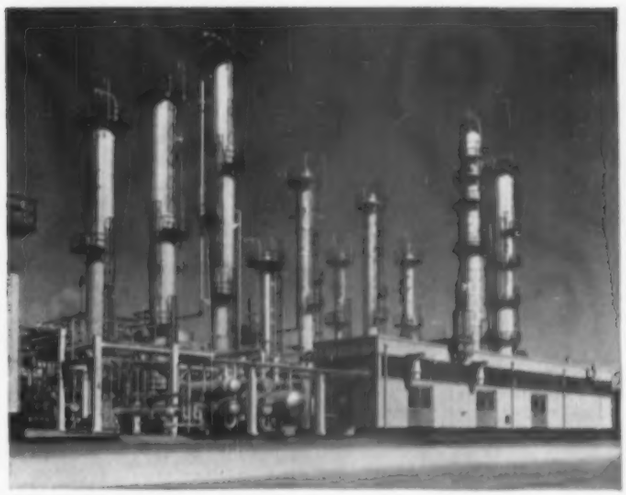

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Canadian Notes

API Refinery Meeting in Canada

The 1956 midyear meeting of the division of refining of the American Petroleum Institute will be held in Montreal, May 14-17, 1956. This is the first time the API refining division ever has taken its meeting outside the country. The decision to convene in Canada next spring is in itself signal recognition of the dominion's growing oil industry.

Program for the midyear meeting is being drawn up by a committee under the chairmanship of G. L. Mateer, vice president, Cities Service Petroleum, Inc. Two sessions on analytical research are being developed by the committee on analytical research, of which C. E. Headington, Atlantic Refining Co., is chairman. The committee on training headed by Dean S. Turner, Standard Oil Co. (Ohio), is preparing a training session.

There will be sessions on air pollution and waste disposal developed by the smoke and fumes committee and the committee on disposal of refinery waste. W. H. Claussen, executive secretary, smoke and fumes committee, California Research Corp., San Francisco, is collaborating with John H. Eashagen, chairman, committee on disposal of refinery wastes.

Corrosion, electrical equipment, and instrumentation will be the topics of three sessions of particular interest to mechanical engineers employed in refining. In addition, there will be a session on processes, one on fuels and lubricants and one on refinery maintenance.

Drilling in Canadian Lake

Harold L. Strader of Houston is drilling ten exploratory tests in Lake St. Clair, Canada, for Lake St. Clair Gasfields Ltd. The exploratory program is the first ever carried on in Canadian waters from a drilling barge, Mr. Strader said. The first well topped reef formations at about 1,500 feet and was bottomed at 3,005 feet. Drilling time for each test is estimated at two weeks. The drilling barge was moved from Houston to the Canadian lake just east of Detroit in 29 days, arriving on location about June 1. Lake St. Clair Gasfields has a license to explore 100,000 acres in the lake.

Appoints Canadian Agent

Texas Instruments Inc., Dallas, manufacturer of electronic and electromechanical components and apparatus, has appointed Computing Devices of Canada Ltd. as its exclusive Canadian agent. CDC main offices are at 311 Richmond Road, Ottawa 4, Ontario.

Appointed Royalite Chairman

C. U. Daniels of Calgary, president and managing director of Royalite Oil Co. Ltd. since August 1951, has been appointed chairman, and Ray Althouse, executive vice president since 1952, has succeeded him in the presidency. Mr. Daniels will continue as Royalite's chief advisory officer and will remain active in company affairs. In future, however, he will be able to devote more of his time to company policy making and the planning of any additional projects that may be contemplated.

C. U. Daniels

R. Althouse

New Imperial Terminal

Imperial Oil Ltd. has announced plans to build a marketing distribution terminal at Burnaby, B.C., and a six-inch products pipe line about six miles long which will cross Burrard Inlet to link the new terminal with Ioco refinery. The pipe line and the first phase of the terminal's construction will cost upwards of $900,000.

The new Burnaby terminal will eventually replace Imperial's plant in downtown Vancouver, from whence the company has distributed its products for half a century.

"Imperial's distribution facilities in the Vancouver area must be expanded because of the great industrial development in B.C. and the increased oil demand that can be predicted," Mr. Ritchie said.

He said the suburban site was chosen for the terminal to relieve traffic congestion in the city.

The pipe line, which will carry gasolines, fuel oils and other finished products, is scheduled to begin deliveries to the new terminal early this fall.

Tax Group Formed

The Canadian Petroleum Tax Society was formed recently when the organization adopted its constitution during a meeting held at the Palliser Hotel, Calgary. The society will promote interchange of information among members and conduct research and educational programs in the field of taxation.

D. M. McGeer, Sun Oil Co., is president and first vice president is J. B. Frazer, Canadian Gulf Oil Co. Other members of the executive are: J. R. McCormick, Shell Oil Co., 2nd vice president; O. C. Windrem, Texaco Exploration Co., secretary; R. G. McCallum, Western Leaseholds Ltd., assistant secretary; and W. H. Atkinson, Oilwell Operators Ltd., treasurer. Directorate includes: M. P. Rollick, Socony Vacuum Oil Co. of Canada Ltd.; W. Mitchell, General Petroleums of Canada Ltd.; and L. L. Seville, Imperial Oil Ltd.

Tar Sands Development Planned

Royalite Oil Company Ltd. and Can-Amera Oil Sands Development Ltd. have announced a program of continued development expected to bring about commercial production of crude oil from the bituminous sands of Northern Alberta.

Under the direction of special technical personnel, the development program will include the use of a patented separation method known as the Coulson process. The equipment to be used was manufactured to Can-Amera's specifications by the special process division of the De Laval Separator Co.

Canadian Catalyst Plant

Construction has been started on the new $6 million synthetic fluid petroleum cracking catalyst plant at Valleyfield, near Montreal, of Davison Chemical Co. Ltd. Badger Division of Stone & Webster Engineering Corp. are architect-engineers. W. E. Maclean, of Davison's central engineering department at Baltimore, has been named project manager for the construction.

Electrifying More Fields

Saskatchewan Power Corp. will, in the near future, construct and energize electrical transmission lines to more than 120 new oil wells in four of the province's major oil fields. Work is nearing completion on lines leading to 43 new wells in the Coleville field, while construction work on transmission lines to 40 wells at the Cantuar field, 36 at the Success field and six at the Fosterton field will be undertaken shortly.

Offer to Acquire Assets

Canadian Oil Companies Ltd. has made an offer to acquire the assets of Anglo-Canadian Oil Co. Ltd. The offer is the equivalent of $2.75 in cash and a 1/7 share of Canadian Oil Companies Ltd. for each share of Anglo-Canadian outstanding.

H. R. Milner, president of Anglo-Canadian, announced that the board has unanimously recommended the acceptance of this offer by shareholders.

J. P. Wiseman

J. G. Bounds

New Fluor Company Formed

J. P. Wiseman, president of the Fluor Corp. of Canada Ltd. for the past two and a half years, has been named to head a newly established products company of the Fluor Corp.

J. G. Bounds, a member of the Fluor organization since 1939, was named to succeed Mr. Wiseman as president of the Canadian firm. The appointments are effective November 1.

Fluor's product division has been responsible for the manufacture, sale and erection of natural draft and induced draft cooling towers, as well as other products, including pulsation dampeners and pulsation dampening systems, mufflers for noise reduction of gas engines, and gas cleaners for the removal of both liquids and solids from natural gas.

Saskatchewan Well Chart

A new "Schedule of Wells" aimed at informing geologists and engineers of all wells drilled in Saskatchewan during a two-year period has been completed and is now available from Saskatchewan's Department of Mineral Resources, Petroleum and Natural Gas Branch.

The 300-page publication covers the period from January 1953 to December 1954, and includes a new stratigraphic correlation chart for Saskatchewan and adjoining areas.

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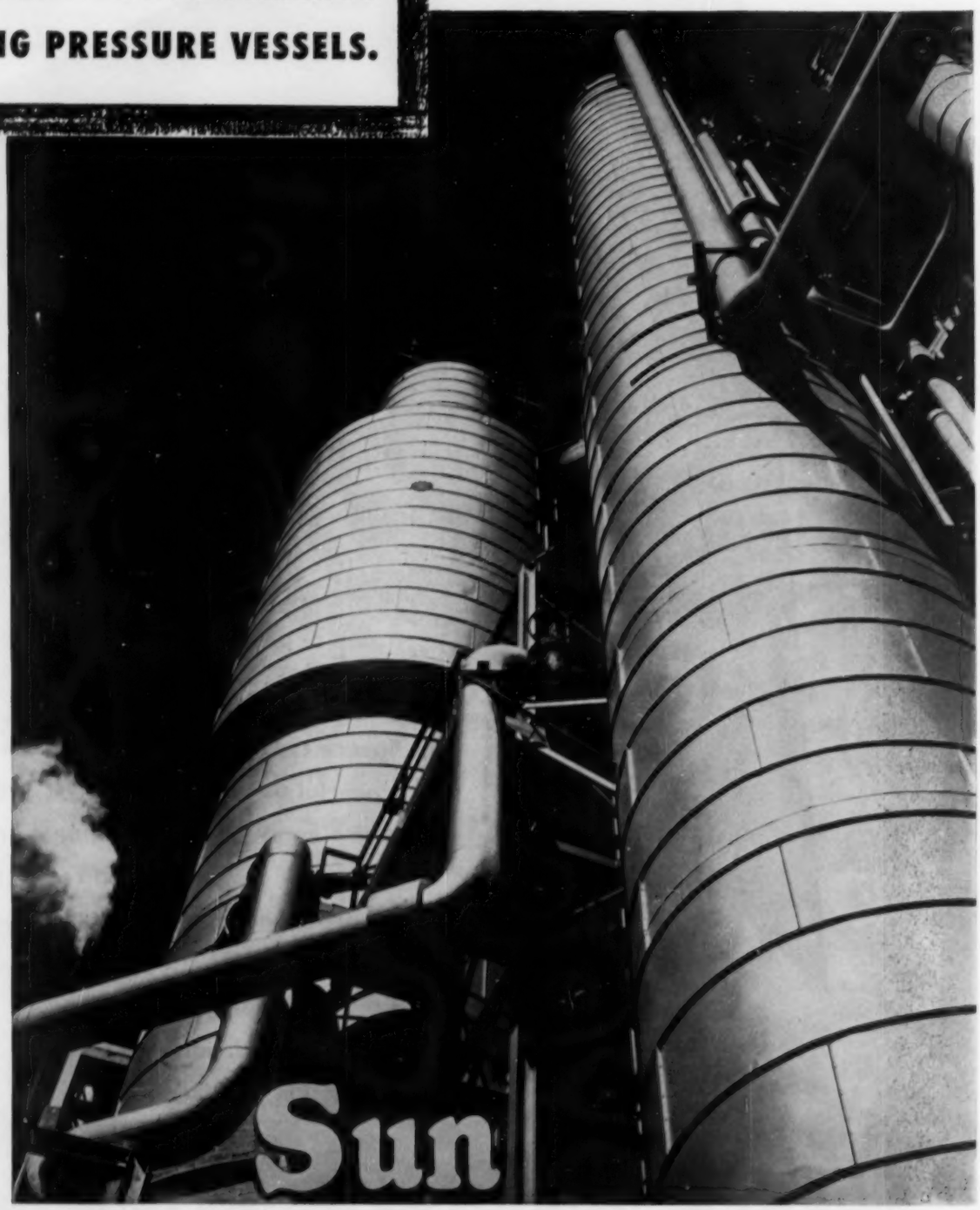

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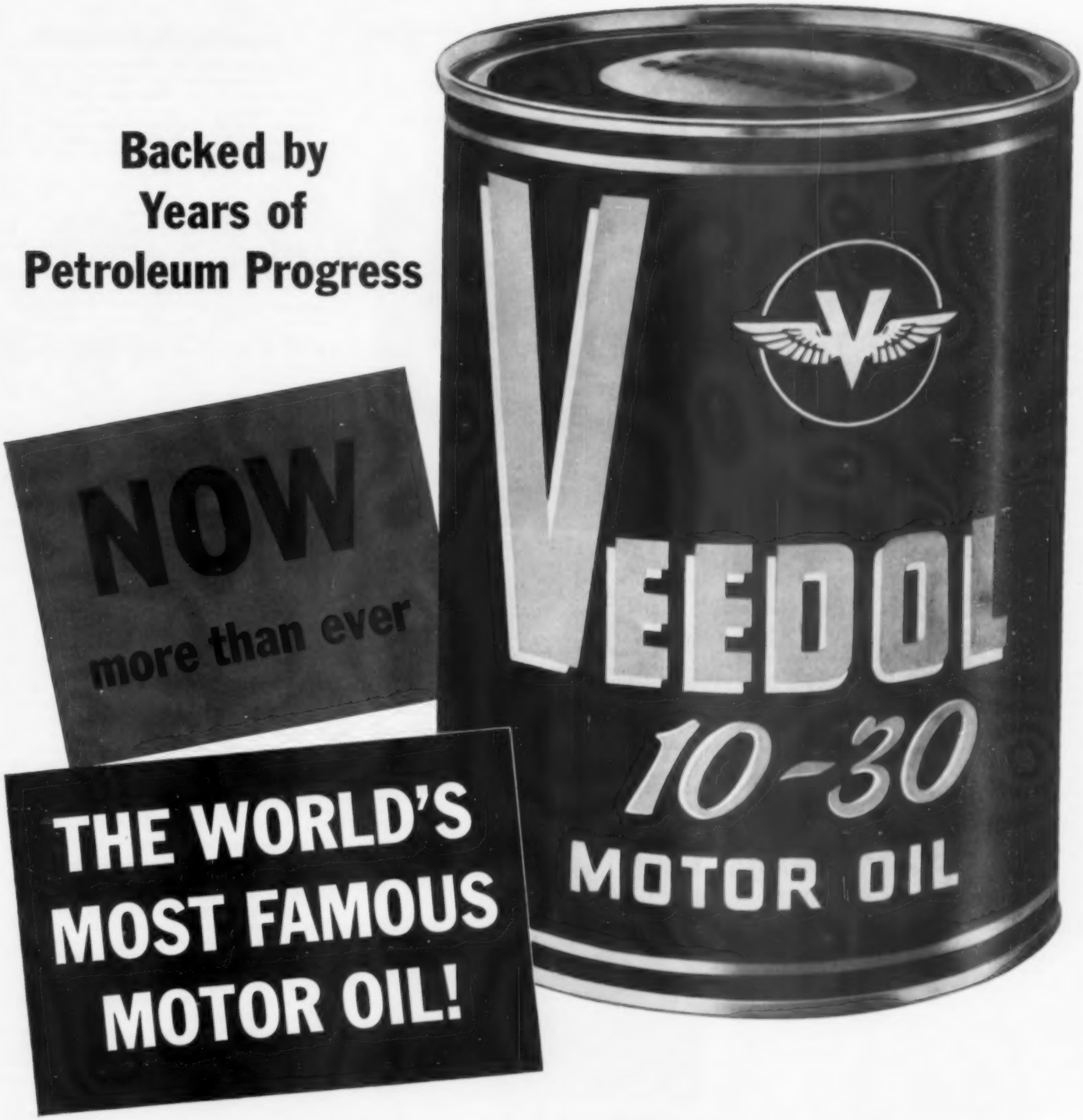

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New Veedol 10-30 is the culmination of over three quarters of a century of petroleum progress. Building pipelines, sinking wells, building refineries, the producers of Veedol have grown from a tiny enterprise in America's first field to a major oil company with producing facilities in a dozen different states and distributing centers throughout the world.

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International News and Notes

Honor for R. Meganck

R. Meganck, managing director of The British Petroleum Company's associate, BP Belgium, has been appointed by His Majesty the King of the Belgians a "Chevalier de l'Ordre de la Couronne" in recognition of his meritorious activity in industry during the last 25 years.

Mr. Meganck has been with the BP group for that period, and has been managing director of BP Belgium since 1951.

Last year Mr. Meganck, who is 46, was appointed by King Bauduin a member of the "Cadets d'Honneur du Travail de Belgique," a body composed of leading Belgian personalities who have rendered exceptional services to the community.

R. Meganck

Sumatra Program Approved

A $20 million modernization program has been approved for Standard-Vacuum Oil Company's Sungei Gerong refinery near Palembang, Sumatra. The improvements, which will take about two and one-half years to complete, are part of the company's four-year $80 million capital investment program in Indonesia announced by Stanvac last January.

The modernization will include:

1. Installation of a 10,000 b/d (feed rate) recycle fluid catalytic cracking unit.
2. Installation of a 1,100 b/d (product output rate) non-selective catalytic polymerization plant.
3. Revamping of existing process equipment to increase throughput and to enable the refinery to handle the crude oil from Stanvac's Lirik producing field in Central Sumatra more efficiently.

Another project included in Stanvac's current capital investment program in Indonesia is the building of a 90-mile pipe line from the Lirik field to carry 20,000 b/d of crude oil. Coastal craft will be used to convey the crude from the pipe line terminal to the Sungei Gerong refinery. The pipe line will be completed in 1958.

Already being installed are additional power generating facilities, and bids are being received for a new sulfuric acid plant at the refinery, which is owned and operated by Standard-Vacuum Petroleum Maatschappij.

Antar-Petroles to Build Houdriformer

A 10,800-barrel Houdriformer will be built by Antar-Petroles de l'Atlantique at its refinery in Donges, France, to process naphthas from Iraq crude. A blocked operation will be utilized by which the unit will alternately produce high-octane motor gasoline and aromatics. Houdry Process Corp. will furnish the process design. Engineering and construction will be by Hydrocarbon Research, Inc.

Pemex Signs Contract for Sale of Crude

Petroleos Mexicanos has signed a contract for the sale of crude from its Gulf Coast Ordonez field to the newly-formed Seminole Oil and Refining Co. of Florida, which is planning to construct a 20,000 b/d refinery at Fort Pierce exclusively for the handling of this product. The resulting products are slated for distribution in the markets of Florida and nearby states.

Aid in Military Pipe Line Design

A three-man Navy oil industry board of review is in Spain to study the engineering and design of pump station facilities along the new 485-mile U.S. military pipe line being built to supply American air bases there. Members of the board are: Karl T. Feldman, director of engineering, Sinclair Pipe Line Co.; D. W. Calvert, technical department, Phillips Pipe Line Co.; and Earle Corliss, Bureau of Yards and Docks, U. S. Navy.

U.S. Navy Flagship Aids in Tanker Collision

When the Italian tanker "Argea Prima" and the Dutch tanker "Tabian" collided in the Persian Gulf on May 19, the seaplane tender "USS Valcour" and the frigate "HMS Loch Killisport" went to their assistance. Fire broke out on both ships involved in the collision.

The accompanying U.S. Navy photos taken by personnel of "USS Valcour" shows highlights of the successful fight to save the "Argea Prima."

"USS Valcour" is the flagship of Rear Admiral Allen Smith, Jr., Commander of the Middle East Force.

Shown is the fire-swept stern of the "Argea Prima."

Photo shows Cdr. John E. Porter, USN, who was in charge of the fire-fighting party that went aboard "Argea Prima" from "USS Valcour."

Record Drill Collars in India

Drill collars that are believed to be the largest in the world are used by Assam Oil Co. Ltd. in operations in the new Nahorkatiya field of Upper Assam, India. The collars, 12 inches in outside diameter and 50 feet long, weigh 18,000 pounds each. Assam also has available a number of collars 10 inches in outside diameter by 50 feet long, and others 10 inches by 40 feet.

Drilling is to a depth of approximately 10,500 feet, using a 29½-inch hole with 24½-inch casing to 100 feet, a 20-inch hole with 16-inch casing to 1,000 feet, a 14¾-inch hole with 10¾-inch casing to 7,000 feet, and a 9½-inch hole with 7-inch casing for the remainder.

To drill a 14¾-inch hole to 7,000 feet is particularly difficult in the Nahorkatiya field, where formations are hard, entailing high rock bit expense, and marked by steep dips, creating a possibility of crooked hole trouble. In order to get adequate weight on the bit and to keep the hole straight, Assam ordered the extra size drill collars, which were made at the Torrance, Calif., plant of The National Supply Co.

Method Proposed to Settle Dispute

The Government of the Philippines has approved a proposed method of settling the problem arising from the overlapping applications for oil exploration rights in the Cagayan valley of Northeast Luzon filed by Standard-Vacuum Oil Co. and Philippine Oil Development Co. The settlement is expected to lead to the granting of an exploration concession and to an intensive search for oil in the area.

Under the settlement, the disputed area is divided into three sections with Philippine Oil Development Co. (Podco) receiving two thirds and Stanvac one third of the area. The two companies are working out a cross-option arrangement involving two of the three sections under which each will have the option of acquiring one-third of the production obtained in the other's section. Podco will have exclusive development and production rights in the third section.

Based on this formula and the anticipated granting of all other areas now under application, Stanvac is looking toward eventually exploring 380,000 hectares (more than 900,000 acres) in the Philippines.

Westinghouse Names Two Sales Executives

R. D. McManigal, formerly vice president of Westinghouse Electric International Co., has been appointed vice president in charge of sales, and J. D. Mickle, formerly general sales manager, has been elected vice president of Westinghouse Electric Company of Brazil.

Announced by W. E. Knox, president of Westinghouse Electric International Co., the change in responsibilities brings all company product sales and project activities under Mr. McManigal's direction. He was formerly in charge of foreign licensing and other relations with associated companies.

LPGas at Kwinana Refinery

To meet the increasing demand in Australia for "bottled gas," an LPGas bottling plant is to be installed at The British Petroleum Company's Kwinana refinery in Western Australia.

Gases will be bottled or loaded into bulk vehicles. Work on the unit is expected to start towards the end of the year.

Also at Kwinana, a bitumen plant has started production. Installed at the request of the West Australian Government, it will produce about 2,000 tons a year of bitumen for road construction.

Dr. Ernesto Letayf Bourge

Dr. Ernesto Letayf Bourge, for many years physician to Petroleos Mexicanos and one of Mexico's outstanding surgeons, died July 11 of chronic hepatitis in Mexico City. He was 57 years old.

THORNYCROFT 'BIG BEN'

Dump Trucks and Tractors for the OIL INDUSTRY

Thornycroft "BIG BEN" heavy duty vehicles with the latest Thornycroft 11.33 litre 155 b.h.p. diesel engine are now in full production.

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The Thornycroft organisation with its ability to provide Specialised Transport is constantly called on to produce trucks to the exacting requirements of the Oil Industry. In addition to the "Big Ben" shown here, a 6 x 6 version of the "Nubian" cross-country chassis has recently gone into service, making our already wide range yet more comprehensive.

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Oil Industry Investment Sets New Record in 1954

American oil companies last year invested a record-breaking $6.4 billion in the United States and foreign countries, according to the annual survey of the petroleum industry by the Chase Manhattan Bank. In the post-war years 1946 through 1954, 35 representative companies covered by the study have made capital expenditures of $23.6 billion for domestic and foreign facilities.

Frederick G. Coqueron, Chase Manhattan petroleum analyst who prepared the 40 page "Financial Analysis of the Petroleum Industry for 1954," pointed out that the major portion of last year's investment by American companies was for the purpose of increasing crude oil production, with only 35 percent being allotted for refining and other facilities.

The Chase Manhattan study reviews the petroleum industry on a national and world-wide basis as well as giving a detailed analysis of the combined activities of 35 leading U.S. oil companies. These companies last year produced about 58 percent and processed about 66 percent of the Free World's supply of crude oil. Their domestic net output represented 54 percent of all U.S. production and they processed more than 85 percent of the total U.S. refinery crude throughput.

An all-time high both in earnings and dividend payments was the background for last year's record capital investments. The net income of the 35 companies studied was $2,319 million, an increase of 1.4 percent over 1953. A slight decrease in earnings from domestic operations was more than offset by increased foreign operations which resulted from greater consumption abroad and continued high rate of crude production in the Middle East countries.

To their stockholders, the 35 companies paid a total of $991 million in cash dividends, or 42.7 percent of earnings, while several companies distributed an additional $434 million in capital stock and other dividends.

New financing and the sale of assets accounted for a gain of $163 million in the working capital for the group. The combined net current assets for the 35 companies amounted to $5,502 million at the end of $1954 as against $5,339 million in 1953. The ratio of current assets to current liabilities was 2.5 to 1, the same for both years. Of a total of $353 million of new financing obtained in 1954, all but $9 million was borrowed.

Commenting on the growth of the industry since World War II, Mr. Coqueron noted that total assets were up 148 percent from 1954, while gross operating income increased 193 percent. Total income for 1954 was $22,762 million.

Earnings of the 35 companies from foreign operations increased 22.1 percent in 1954 to $851 million. Domestic earnings fell 7.6 percent to $1,468 million.

Of the $3,669 million in capital expenditures in 1954, the companies spent $619 million abroad and $3,050 million in the United States. In addition, U.S. companies advanced $91 million to non-consolidated foreign affiliates for development purposes.

At the close of the year the 35 companies had foreign net assets of $3,096 million, compared with $15,528 million domestic net assets. Of the foreign assets, 66 percent was in the Western Hemisphere.

Fixed assets in foreign countries totaled $2,425 million and domestic net investment $13,660 million.

The 35 companies produced 1,625,000 b/d of crude in foreign countries and 3,432,000 b/d in the United States. In addition, the 35 companies have interests in non-consolidated foreign companies. Adding net interest of the 35 companies in the non-consolidated companies, total foreign production in 1954 was 3,208,000 b/d. Of this, 1,595,000 b/d was from the Middle East, 1,229,000 b/d from Venezuela and 384,000 b/d from other countries. The 35 companies and their subsidiaries produced 57.5 percent of Middle East oil and 64.8 percent of Venezuela's oil.

Refinery throughput of the companies outside the United States averaged 1,216,000 b/d and including their equity in non-consolidated subsidiaries, this volume was 2,133,000 b/d.

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67-5

To Build Williston Basin Line

Shell Oil Co. and the Murphy Corp. have announced plans for a new pipe line to carry crude oil out of the Williston Basin.

The line, to be 16 inches in diameter and 450 miles long, will run south from the eastern Montana area of the Williston Basin to connect with lines now operating from eastern Wyoming—the Platte Pipe Line of Guernsey and the Western Pipe Line at Fort Laramie. These lines run east to important refining centers at Chicago and Wood River, Illinois.

The line will be operated by a new company, which will be jointly owned by Shell and Murphy. Construction will be started this spring as soon as weather conditions are favorable.

Edgar M. Clark

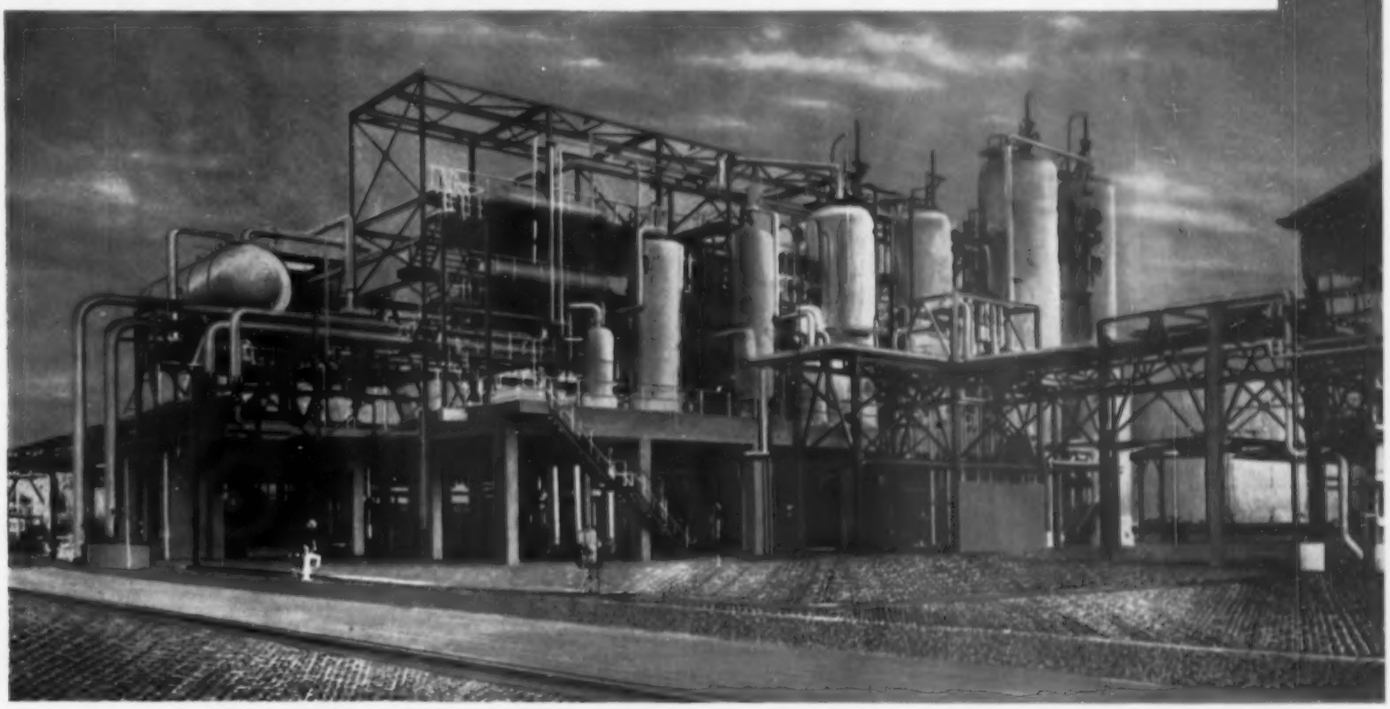
Edgar M. Clark, 82, a former vice president of Standard Oil Co. (N.J.) and co-inventor of the first successful cracking process in the petroleum industry, died July 30 at Phoenix, Ariz. He retired in 1933 after 43 years of active service.

Mr. Clark joined the shipping department of Standard Oil Co. of Indiana in 1890. Becoming associated with the late Dr. William M. Burton, Mr. Clark assisted in the invention of the Burton pressure still.

In 1918 Mr. Clark joined the Standard Oil Co. (N.J.) organization as general manager of the Bayway refinery at Linden, N. J. Within two years he was elected a director of Jersey Standard and in the re-organization of the company in 1927 became president of what is now Esso Research and Engineering Co. and also president of what is now the Esso Shipping Co. He was elected a vice president of Jersey Standard in 1930.

As president of the research company, Mr. Clark was identified with the early development of the hydrogenation process in its application to oil refining in the U.S. He also was one of the founders of the Ethyl Corp.

OIL FOR EUROPE'S INDUSTRY



The new deasphalting unit at Shell's Refinery at Pernis, near Rotterdam, The Netherlands, has a maximum design charge capacity of 12,000 barrels of reduced crude per day.

As part of an expansion program at their Refinery at Pernis, N.V. de Bataafsche Petroleum Maatschappij, a subsidiary of Royal Dutch Shell, employed E. B. Badger & Sons Limited, in collaboration with Stone & Webster Engineering Corporation, to design and engineer a new propane deasphalting and decarbonizing unit.

The unit produces lubricating oil base stock and catalytic cracking unit feed stock.

Important fuel savings are made by employing multiple effect evaporation for the first time in this type of unit to remove propane from the oil stream.

Design work was begun in September, 1952, and the unit—largest of its type outside of the United States—went on stream in the fall of 1954. Actual construction was by local contractors.

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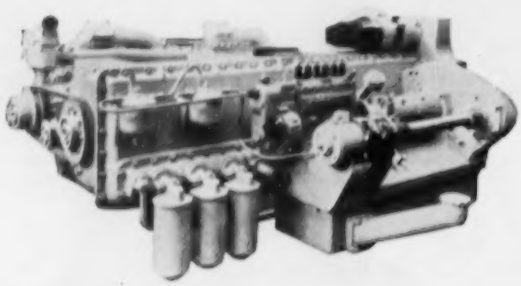
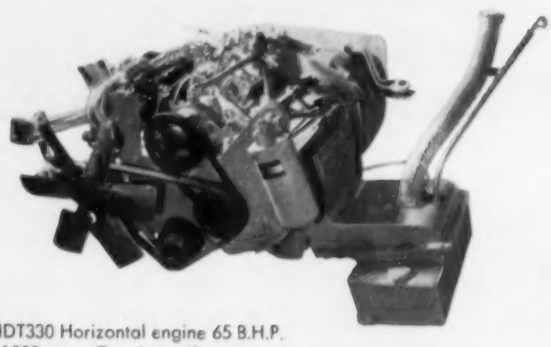
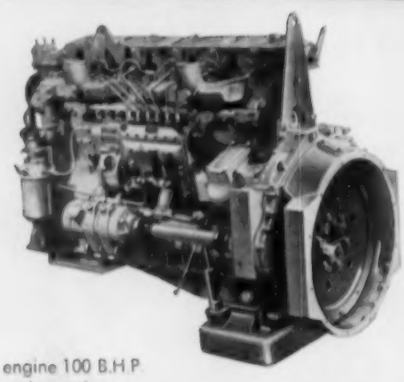
A Jamaican Railways rail-car using a Meadows Diesel engine.



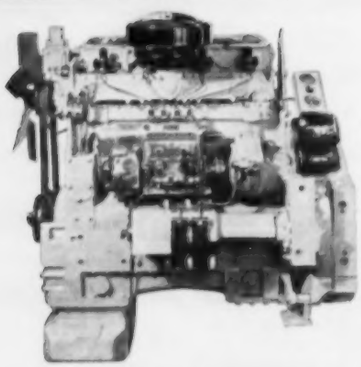
6HDT970 Horizontal engine 165 B.H.P. at 1800 r.p.m. Traction rating.



4HDT330 Horizontal engine 65 B.H.P. at 1800 r.p.m. Traction rating.



6DT630 Vertical engine 100 B.H.P. at 1600 r.p.m. Traction rating.



4DT420 Vertical engine 66 B.H.P. at 1600 r.p.m. Traction rating.

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Oil Company Staff Changes

ROY B. KELLY, Washington, D. C. attorney, has been elected president of Toklan Oil Corp. to succeed Curtis F. Bryan, resigned.

A controlling interest in Toklan was recently purchased by Cecil V. Hagen, of Houston, representing a group of investors. New Toklan vice presidents are Vaughn Bryan of Tulsa and James L. Ballard of Houston. The new board of directors includes Holman Jenkins, Dallas attorney; Wallace M. Davis, Jr., of the Investment Management Corp. of Dallas; A. F. Childers, Jr., of Houston; Richard R. Ohrstrom, New York City investment banker; plus Mr. Ballard and Mr. Kelly. Mr. Hagen was appointed consultant.

ARTHUR L. FLOOD has been appointed geologist for Lion Oil Company's recently opened Regina, Saskatchewan subdistrict office. He is a native of Saskatoon and was graduated from the University of Saskatchewan in 1949 with a B.Sc. degree with distinction in geological engineering.

ROBERT B. SMITH, Forth Worth, Texas, has been promoted to assistant division land superintendent for Continental Oil Co., with headquarters at Midland, Texas. He was formerly assistant to Conoco's southwestern region land superintendent at Fort Worth.

FRED H. CARR, formerly district geologist for The British-American Oil Producing Co., Casper, Wyo., has been promoted to division geologist at Denver. Mr. Carr is succeeded by Thomas W. Bibb, who was transferred from Ardmore, Oklahoma.

EDWARD N. LEIBACHER, a director of Standard-Vacuum Oil Co. since 1951, has been elected a vice president of the company, it was announced by H. F. Prioleau, president. He thus becomes one of three vice presidents on Stanvac's 10-man board, all the members of which serve as full-time executives.

A veteran of 39 years in the petroleum industry, Mr. Leibacher went to Sumatra in 1928 to supervise construction of Stanvac's first major refinery near Palembang. He joined the company's New York headquarters staff in 1933 and four years later returned to Indonesia as assistant general manager of the company's producing and refining operations there.

Following the war, he went back to Palembang to help direct the company's extensive refinery rehabilitation program. He was named Standard-Vacuum's coordinator for Indonesian affairs at New York in 1947, a position he held until his election to the board of directors four years ago.

JOHN A. POULIN, who has held many posts all over the world both in industry and government, has joined the Sinclair Oil Corp. as assistant to the vice president in charge of foreign production. For 10 years, he was in geological exploration work with Sinclair in Venezuela and Colombia. He also was with United Geophysical Co. in South America for five years.

For the past six years, he has been with the Department of the Interior, first as director of the foreign branch of the Oil and Gas Division, and later as foreign production specialist with the Petroleum Administration for Defense and with the Office of Oil and Gas.

MILTON C. HOFFMAN, for many years associated with Stanolind Oil and Gas Company, Tulsa, has been elected a vice-president of Continental Illinois National Bank and Trust Co. of Chicago, in which capacity he will be active in the field of oil and gas financing. Mr. Hoffman joined Midwest Refining Co. in 1919 and later served Stanolind Oil and Gas and Pan-Am Southern Corp. He was a vice president and director of Pan-Am in charge of exploration, production and pipe line activities from 1949 to 1954.

CHARLES E. SPAHR, executive vice president of Standard Oil Co. (Ohio), has been made a director of the company. Mr. Spahr has been with Sohio since 1939, except during World War II, when as an Army Major (Corps of Engineers) he supervised construction of a 570-mile pipe line in the India-Burma theater of operations.

Following the war, he was active in various phases of the management of the transportation department of Sohio, becoming vice president for transportation in 1951 and thereafter an assistant to the president.

WILLIAM R. WAAG has joined The First National City Bank of New York as petroleum engineer in the petroleum department. Until recently, he had been senior engineer, specializing in oil reservoir engineering, with the Sohio Petroleum Co., Oklahoma City.

T. C. BANTA has been elected vice president and a director of Sinclair Refining Co. and director of purchases of the subsidiary companies of Sinclair Oil Corp. He has been a member of the Sinclair organization since 1930, starting in the central engineering department of the Company's East Chicago, Ind. refinery. He transferred to the purchasing department in New York in 1938 and was appointed purchasing agent in 1950.

J. A. Poulin

M. C. Hoffman

C. E. Spahr

E. N. Leibacher

T. C. Banta

W. R. Waag

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All equipment for television and radio broadcasting and receiving, point-to-point communication.

J. C. THOMPSON has been granted early retirement by Pan-Am Southern Corp. to establish his own independent geological consulting office in El Dorado, Ark. He has been engaged in geological work with Pan-Am Southern and its predecessor, Root Petroleum Co., in El Dorado since 1928. His retirement was effective July 12, 1955.

C. B. HEARTWELL has been appointed superintendent, gas and natural gasoline division, southern district, producing department, for Standard Oil Co. of California. He succeeds G. C. McLaren, who has retired after more than 38 years of service with the company.

C. F. WHALEY, Chet Whaley Well Servicing Co., Houston, was elected president of the American Association of Oilwell Drilling Contractors June 13 to fill the unexpired term of J. V. Dunbar, who died suddenly June 5. Mr. Whaley was national vice president of the Association.

R. A. WALTERS has been appointed general manager of International Petroleum (Colombia) Ltd. His headquarters will be in Bogota. Mr. Walters was born in Gorgona, Canal Zone, Panama, and graduated from the Colorado School of Mines in geological engineering in 1936. In that year he commenced employment with Standard Oil of Louisiana, and in 1938 transferred to Carter Oil Co. Since 1946 he has been with Imperial Oil Ltd. in Canada, first as division geophysicist, later as assistant division exploration manager, and since 1949, division exploration manager. In the latter capacity he was a member of the western division management committee.

Since 1951 E. C. Borrego has served as general manager of International Petroleum (Colombia) Ltd. in addition to his duties as executive representative in Colombia. Mr. Walters' appointment will enable Mr. Borrego to devote his entire attention to International's interests in affiliated companies in Colombia.

B. W. Beebe

B. W. BEEBE, Oklahoma City, has been elected vice president in charge of production of the Keating Drilling Co., Tulsa. Offices under his direction have been opened in the Kirkpatrick Oil Co. Building, 1300 North Broadway, Oklahoma City. Mr. Beebe has withdrawn as a partner in the firm of Manhart, Millison and Beebe, exploration consultants and oil operators.

E. A. AUSTIN, Houston, has been promoted to manager of production for Continental Oil Company's southern region. Formerly assistant regional production manager, he will succeed Hal F. Nabors, who recently was promoted to assistant manager of Conoco's central region at Oklahoma City. Mr. Austin joined Conoco in 1939 as a roustabout at Tepetate, La. He became assistant production manager for Conoco's southern region, with headquarters in Houston, in 1952.

A. R. GOLDSBY has been appointed a director of research of Stratford Engineering Corp., Kansas City, Mo. Dr. Goldsby was formerly with The Texas Company and Texaco Development Corp. since 1936. Much of his early work with Texaco was concerned with research in fuels and the development of the sulfuric acid alkylation process. He is the inventor or co-inventor of many of the important commercial features of this process. Later in Texaco Development he was also concerned with inventions and the licensing of processes and equipment developed by and acquired by Texaco.

Stratford was recently appointed as an agent for the sulfuric acid alkylation process and Dr. Goldsby will continue to be active in this field.

Dr. A. R. Goldsby

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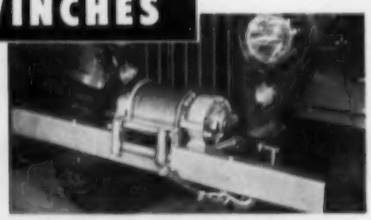
- Convenience—Roll-down windows, full opening.

KING WINCHES

King Winch on R-140 and R-160 International



P.T.O.-driven King Winch on Willys Jeep

KING WINCHES FOR KING-SIZE PULLING JOBS

For all Willys Jeeps, trucks and 4 x 4 station wagons . . . also for Ford, Chevrolet, International and Dodge trucks.

King Winches keep you moving through the most difficult terrain . . . you get action where there's no traction with dependable pull power designed to fit specific pull and hoist needs. Koenig power winches have pull capacities of 8,000 to 19,000 lbs.

Koenig Jeep cabs and King Winches for Willys vehicles are available through Willys Motors, Inc., and Willys-Overland Export Corp. distributors or dealers. Write for free descriptive literature.

Koenig IRON WORKS, Inc.
2214 Washington Ave. Houston, Texas

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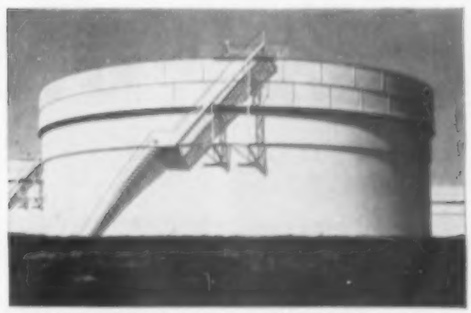
Expansion Roof Tank

It is now generally recognized that the Graver Expansion Roof Tank has no peer for protecting volatile liquids from evaporation loss. One such tank often protects an entire terminal. It is easy to manifold to cone roof tankage. The positive liquid seal protects under all conditions. You eliminate breathing losses and minimize filling loss with the Graver Expansion Roof Tank.



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East Chicago, Indiana

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GRAVER ...CONSERVATION TANKAGE FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

M. E. Montrose

JAMES R. ARRINGTON has been named manager of the economics department of The Carter Oil Co., succeeding G. D. Priestman, who has been sent to New York to become head of the economics section of the producing coordination department of Standard Oil Co. (N.J.).

Mr. Arrington joined Carter as a roustabout in 1937 and two months later went to Venezuela as a petroleum engineer. In 1942 he returned to Carter. In 1951 he became chief economist and was named assistant manager of the economics department in 1953.

Mr. Priestman was employed by Standard Oil Co. (N.J.) in 1937 as a student engineer. In 1947 he was a senior test engineer in the Esso Technical Service Division at Linden, N. J., when he joined Carter as assistant to the vice president in charge of manufacturing. He was head of the supply and transportation department at Denver for three years before being named assistant manager of the economics department in 1950.

M. E. MONTROSE, vice president and director of Hughes Tool Co., was elected president and director of the Petroleum Equipment Suppliers' Association at the meeting of the Association held in Banff, Alberta, Canada.

Other officers elected include: Rainey Elliott, president of Jones & Laughlin Steel Corp., supply division, Tulsa, vice president; H. R. Safford, Jr., re-elected executive secretary; Warton Weems, treasurer; and Leroy Jeffers, assistant treasurer. The firm of Vincent, Elkins, Weems and Searls was re-appointed general counsel.

Mr. Montrose, who now heads the Petroleum Equipment Suppliers' Association, was vice president and director of the group last year. His activities in the industry are world-wide. He is also president and director of Hughes Tool Service Ltd., Canada; director of Hughes Tool Co., Ltd., London; and director of Welex Jet Services, Inc., Fort Worth.

STANLEY T. CROSSLAND, vice president and treasurer, The Texas Co., and Harry H. Arnold, Jr., formerly managing director, N.V. Caltex Pacific Petroleum Maatschappij, Indonesia, have been elected directors of California Texas Co. Ltd. Mr. Crossland replaces A. Neil Lilley, a director and vice president of The Texas Co., who has resigned from the Caltex board.

Mr. Arnold, a vice president of Caltex, has been re-assigned to New York in charge of the producing division.

Mr. Crossland joined The Texas Co. January 1, 1955 in his present capacity. Before Texaco, he was vice president, treasurer and director of the Ethyl Corp.

Mr. Arnold entered the service of Texaco in 1927 as a geologist. During World War II he was a task force engineer officer during the invasion of North Africa, and an expert on mine warfare. He returned to the Texas Co. in 1946 and in 1948 became manager of the Rocky Mountain division. He was later appointed manager, foreign operations (eastern hemisphere) in New York. He joined Caltex in 1953.

ARMSTRONG A. STAMBAUGH, chairman, Standard Oil Company (Ohio), retired on June 30 after 22 years with the company as a director of Sohio and will serve in a consulting capacity.

Mr. Stambaugh was appointed general sales manager in 1929. He was elected a director and vice president in 1933 and continued in charge of all sales activities of the company, both wholesale to large consumers and through retail marketing service and bulk stations until he became chairman in December 1950.

WILLIAM L. NAPOLI, of 1027 Broadway, Bayonne, N. J., has been named lubrication engineer for Tide Water Associated Oil Company's eastern division export sales department. He will work with distributors of company products in Central and South America.

H. C. KAUFFMAN, JR., Shreveport, La., has been appointed production manager for The Carter Oil Company's southern division. During his past nine years with Carter, he held production and engineering posts in Kansas, Oklahoma, Mississippi, Colorado and Arkansas fields.

Willard D. Maxwell, district superintendent at Great Bend, Kan., succeeds Mr. Kauffman as staff assistant at Shreveport. Hugh H. Goerner, assistant district superintendent at Magnolia, Ark., succeeds Mr. Maxwell at Great Bend.

S. T. Crossland

H. H. Arnold, Jr.

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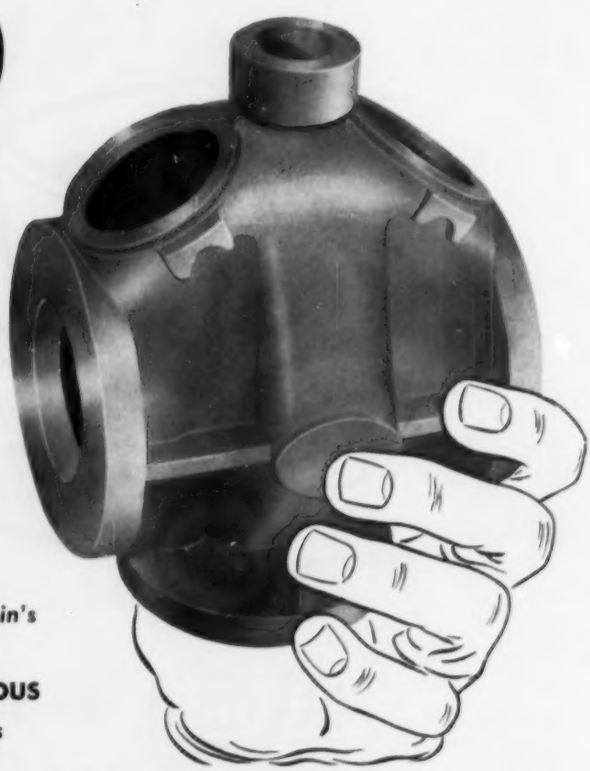

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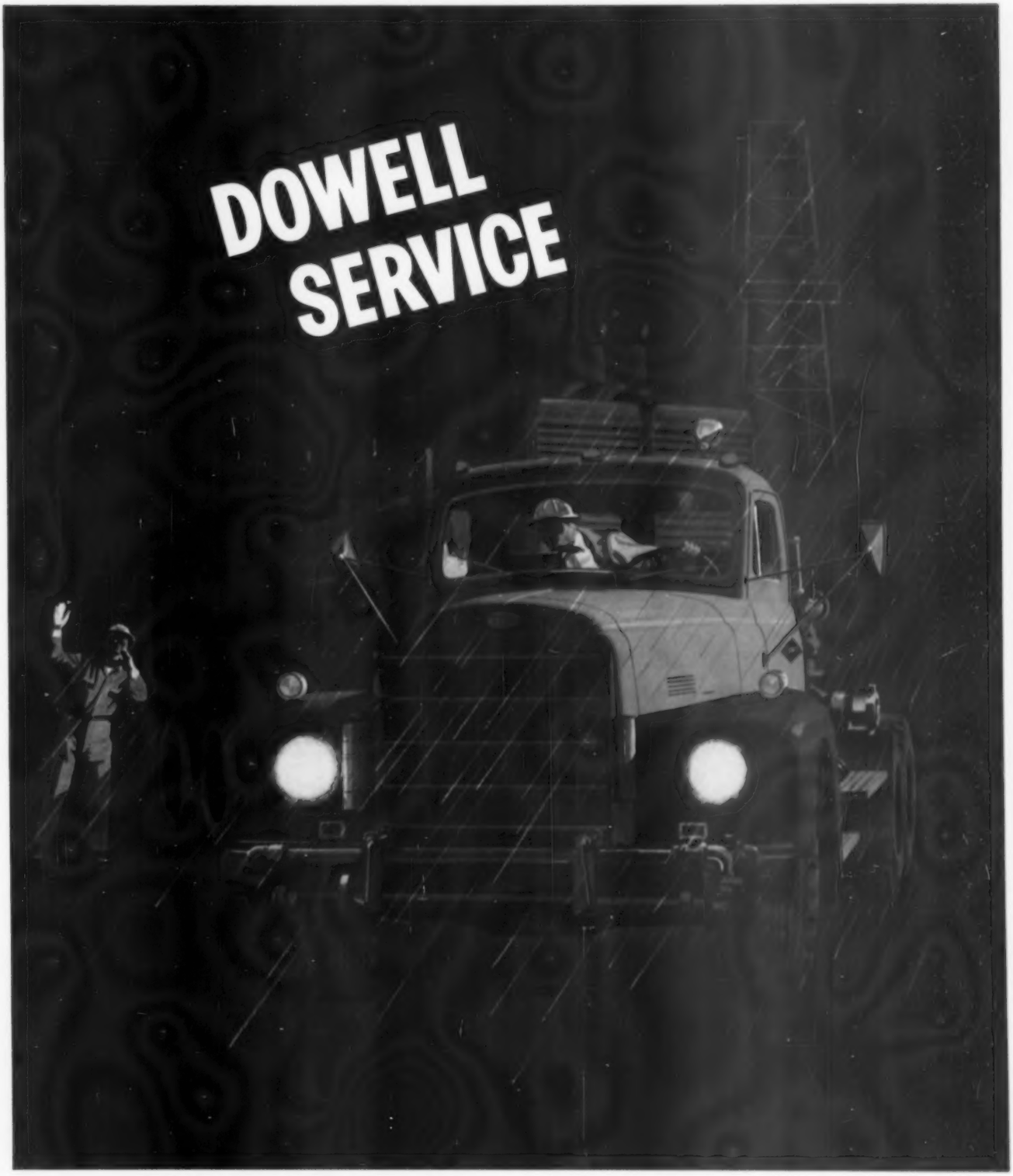

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Performance Tests In South America

PROVE EFFICIENCY OF NEW INSERT ROCK BITS For Shot Hole Drilling in Hard Formations

by Guido De Rossi

Servicios Petroleros, S.A.

Member of Petroleum Branch of A.I.M.E., with M.E. and M.S. from the Stevens and Massachusetts Institute of Technology.

Seismic operators outside the United States know from experience that anticipated performance of the equipment used is one of the most important factors considered in its selection and standardization.

Since most exploratory areas are relatively remote from the daily sources of supply, as one can expect in the States, exploratory equipment must be ordered sufficiently in advance, and in sufficient quantities to keep the crews supplied for normal anticipated operations over an extended period of time.

For this reason, operators are as conscious of the expected use life of every piece of equipment ordered as they are its initial price and operating cost.

Here in South America, as in most areas, I presume, bits are of utmost consideration in the overall efficiency of the crew operation, and can be one of the biggest variables in total party efficiency. Although, generally speaking, bit costs may be one of the lowest unit cost items in the exploratory budget, they can become one of the biggest factors in controlling operational unit or profile costs.

Naturally, we were very anxious to test, in this area, the new carbide insert rock bits developed by Herb J. Hawthorne, Inc., of Houston, Texas, since Mr. Hawthorne is well known throughout the industry internationally as one of the pioneers of low-cost drill bits designed specifically for shot hole drilling operations.

The Hawthorne Insert Rock Bit is a replaceable blade drag bit, utilizing a special quality of tungsten carbide inserts on the cutting surfaces of the blades.

The three blades used in the assembly are forged of tool steel, with the inserts applied by a special welding process developed by Hawthorne which prevents loosening of the inserts while drilling. High toughness of the inserts minimizes breakage, and a unique dressing procedure produces an exceptionally sharp cutting edge, which permits the blades to stay sharp while drilling the harder formations.

Another desirable feature of the bits, from the standpoint of crews operating in the international field, is Hawthorne's patented interchangeable, replaceable blade design, permitting the use of many sets of blades in varying sizes with the same bit body. After the blades have been worn away to the extent that they no longer cut at peak efficiency, they are discarded and replaced with a new set of blades. This provides the driller with his own bit service on the drill, and eliminates the need for attempting to dress the bits in the field, or transport them to and from an oftentimes remote welding shop.

An opportunity came to test these bits under very difficult drilling conditions recently when a seismic party moved into an entirely new drilling area. Drilling was very hard and difficult due mainly to the presence of very hard rolling stone aggregates. We tried to encourage a comparative test, but although the crew uses Hawthorne bits for softer drilling, they were not familiar with the new Carbide Insert Bits; were pressed for time, and had placed an order for 50 well known roller bits to use in this area.

Herb Hawthorne offered to supply two bits free of charge if the crew would give them a trial, so when the bits arrived I drove down to the crew's present location.

Comparative performance tests were arranged and were supervised very closely by the party chief and myself, and the results were rather impressive. The Hawthorne Insert Rock Bits did quite well, and a lot better than was expected by the drillers and all present. Their performance life was approximately 60% of that of the roller bits, but it was agreed that in more compact ground, such as hard limestone or even solid granite, their performance would have been even better.

Penetration was considerably faster and smoother than had been anticipated and considering that investment per bit was approximately one fourth of the cost of the roller bits, the actual savings in bit costs over a period of time, plus the increased drilling speed, represents a considerable opportunity for savings in the overall operational unit or profile cost.

The following month this particular crew planned to return to the area where they had been working previously and where there is hardly any ground similar to the formations they were presently working in. They had previously used only roller bits in this area for the hard limestone and other compact ground, but because of the results of these tests, the crew feels that the Hawthorne Insert Rock Bits can totally replace the roller bits previously used.

They placed a cable order for air shipment of 12 more bits, to run additional tests which they felt confident would confirm their opinions of the original performance tests.

These comparison tests tend to confirm the previous reports from the States that the Hawthorne Insert Rock Bits have been providing exceptional performance in the hard limestone areas of West Texas and up into the Colorado Plateau area; competing very favorably as a drag bit, with the well known roller bits used in those areas. In some areas, due to the improved penetration of the insert bits, and particularly where speed of covering a prospect has been paramount, the Hawthorne Insert Rock Bits have become standard equipment on practically every shot hole drilling rig.

PROMPT SHIPMENT AROUND THE OIL WORLD OF

HAWTHORNE "Blue Demon" ROCK BITS

Helps your exploration budget go farther . . . improving footage production at minimum bit cost.

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★ *Fast delivery from ample stock.*
★ *Meeting field requirements, in hard and soft formations, with economical and efficient performance.*
★ *Satisfying purchasing economies.*

WRITE FOR ILLUSTRATED CATALOG

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P. O. Box 7388 • Houston 8, Texas

Herb J. Hawthorne, Inc.
P. O. Box 7366
Houston 8, Texas, USA

Gentlemen:
Please send me your current catalog on Hawthorne "Blue Demon" Bits.

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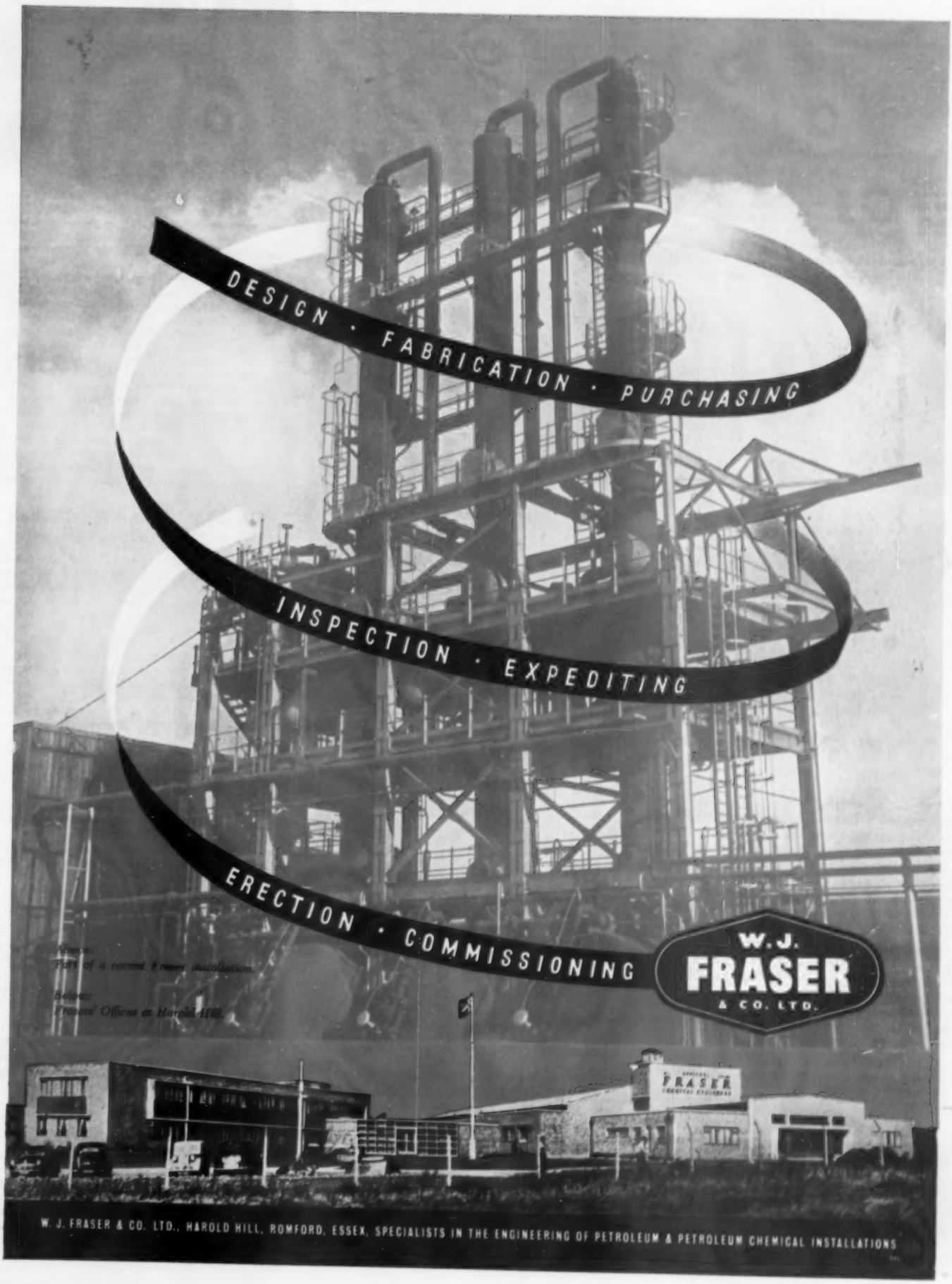
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Meters for High Vapor Pressure Liquids

Rockwell Manufacturing Company's complete line of ER industrial meters for suppliers of liquid propane, liquid anhydrous ammonia and liquid oxygen is described in a new eight-page bulletin (OG 407). Copies are available from the meter and valve division, 400 North Lexington Ave., Pittsburgh 8, Pa.

Replaceable Blade Auger Bit

A new "Blue Demon" replaceable blade auger bit has been developed by Herb J. Hawthorne, Inc., Houston, for drilling softer formations, as a result of numerous requests from the seismic exploration industry. The new bit is available in Type "E," "DB" and "AC" adapter sizes, with blade sizes from 3½ inches through 6½ inches.

Named to Crane Co. Post

Warren A. Logelin, director of public relations for the Chicago Association of Commerce and Industry since 1953, has been named assistant director of public relations for Crane Co. He previously was director of advertising and assistant director of public relations for the Chicago Transit Authority.

API Fire Protection Manual

A new fire protection manual for natural gasoline plants has been published by the American Petroleum Institute. The manual contains recommendations for the protection equipment and an employee training program for use in all types and sizes of natural gasoline and cycling plants.

The manual may be obtained at the [illegible] Headquarters, 50 West 50th Street, at 50 cents per copy.

Murray & Tregurtha

HARBORMASTERS

solve **tough marine power and steering problems!**

Steer in any direction with full power

Easy service and low operating costs

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Models from 40 to 400 h.p. (Series O-4 illustrated; 40 - 50 h.p., Gas or Diesel).

You can solve your tough power and steering problems with Harbormaster Outboard Propulsion and Steering Units . . . the complete heavy duty marine power packages. They are quickly and easily installed for immediate use. They are efficient, economical to operate and maintain . . . and they have many special features not found with ordinary marine power, so they are the answer to many tough marine problems.

If you need easily installed power, better steering control, safety in shallow water, easier maintenance, more efficient performance, simpler hull design, more cargo space, bigger payloads, or simplified crew operation . . . you should investigate the benefits of Harbormaster Outboard Propulsion and Steering.

Send for your copy of the new Harbormaster Catalog today. You'll find detailed information and also many interesting Harbormaster installation photos.

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QUINCY 71, MASSACHUSETTS

MURRAY & TREGURTHA, INC.
26 Hancock St., Quincy 71, Mass.

Please send me New Catalog giving details and showing many photos of Harbormasters in action.

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Oil company representatives from South Louisiana visited the test well of Otis Engineering Corp., manufacturing affiliate of Otis Pressure Control, Inc., recently to observe a functional test of a new type of tubing safety valve. The device combines the operating features of the Otis surface safety valve and the Otis "storm choke." Shown above from left to right are: C. E. DeWitt, Shell Oil Co., Franklin; George Grimmer, Otis, New Iberia; A. Goodrich, Texas Co., New Iberia; Gordon Nunn, Tidewater, Lafayette; Bill Hill, division manager, Otis, New Iberia; Keith Ebner, Texas Co., New Orleans; A. R. Newman, Shell, Franklin; Carl Ivey, Otis test engineer, Dallas; Dick Anderson, Sun, Lafayette; Lowell Wilhoit, vice president for sales and service, Otis, Dallas; Kenneth Robbins, service office manager for Otis, Dallas; and Phil Sizer, Otis design engineer, Dallas, who is explaining the equipment. The new safety device is an automatic, piston-operated valve. When the flow line pressure rises or falls beyond the pre-determined settings of the pilots, the valve closes automatically.

Submersible Motor for Gasoline Pumps

A new submersible pump motor, designed to operate safely while immersed in high-octane gasoline, has been announced by General Electric's general purpose component motor department. The new motor has been slimmed down to fit inside a three and one-half inch gasoline pipe. Since it was early discovered that it would be impossible to keep gasoline from seeping into the motor, it is designed to be flooded with gasoline, the fluid acting as a coolant and bearing lubricant. The windings and stator core are protected from ill effects of the gasoline by being completely sealed in an impervious epoxy resin material.

For added motor protection and fire safety, a thermostat is provided which disconnects the motor from the line shortly after the bulk tank is pumped dry.

The motor is rated ¾ horsepower, 230 volts, 60 cycles, 3,450 rpm. It will absorb a 50-pound thrust, according to G-E engineers, when the pump thrust is away from the motor. Inspection and approval has been obtained from the Underwriters' Laboratories.

Reforming Processes Licensed

Chemical Plants Division, Blaw-Knox Co., Pittsburgh, has been licensed to offer two related reforming processes developed by Hercules Powder Co., Wilmington, Delaware. The hydrogen and olefin processes both utilize alloy tubes set vertically in furnaces of similar design operating at high temperatures.

Several design improvements are being considered and it is possible that use of Blaw-Knox National Alloy Division's new high temperature alloy NA22H may lead to an operation at higher temperatures with resultant greater capacities and economies.

Louisiana Facilities

Otis Pressure Control, Inc., has opened a new warehouse and office building in New Iberia, La., as part of the company's general expansion plans in Louisiana and in South, East and West Texas and at its home office and manufacturing plant in Dallas. Bill Hill is manager of the new Iberia division which operates 24 service trucks in the area.

Scammell

FOUR AND SIX WHEEL DRIVE TRUCKS

Illustration above shows one of the many 6 x 6 Scammell "Constructor" Oilfields Bed Tractors operating in Kuwait and other major oilfields of the world.

Built to 'take it' *on or off the highway*

Scammell 4 x 4 "Mountaineer" Oilfield Tractor.

Scammell four and six wheel drive trucks have been specially designed for operation under the most gruelling conditions. In tropical heat, in the Arctic snowy wastes, in soft, sandy or mountainous terrain—in fact wherever the going is rough and tough Scammell trucks provide the complete, economical and reliable answer for every type of oilfield transportation.

Scammell four and six wheel drive oilfield type trucks and tractors have chassis designed for mounting Well-servicing Hoists, Cranes, Excavators, Drill Rigs, Cement Transit Mixers, etc., etc.

Further details gladly sent on request.

SCAMMELL LORRIES LTD., WATFORD, HERTS., ENGLAND *Telephone: Watford 5231; Telegrams: Twelfton, Watford*

Raleigh Hortenstine

W. B. Van Wart

Inge Grant

J. A. Wilson

Wyatt Metal Promotions

Raleigh Hortenstine, president of Wyatt Metal & Boiler Works, has been elected chairman of the board. Walter B. Van Wart, executive vice president, was elected president, while Inge Grant, vice president, was given the post of manager of operations. Mr. Hortenstine, of Dallas, has been president of Wyatt's since 1938. Mr. Van Wart, executive vice president since 1938, will continue headquarters at Houston. Mr. Grant, manager of the Dallas plant since 1940, will supervise operations of both plants with Houston as headquarters. John A. Wilson, vice president, works manager, becomes manager of the Dallas plant.

Mr. Hortenstine joined Wyatt in 1923. He held the post of vice president and was stationed in Houston at the death of W. J. Wyatt, founder of the company, in 1938. He returned to Dallas after being elected president.

Walter B. Van Wart, the new president, has been with Wyatt through his whole business career. He was 19 years old when his name went on the payroll September 2, 1919, while Wyatt's only plant was on Coombs Street in Dallas. When the Houston plant was nearing completion in 1929, he took over its operations. He was elected a director and vice president in 1934 and held the post of executive vice president from 1938 until his election as president.

As vice president in charge of operations, Inge Grant takes over supervision of the Houston plant in addition to the Dallas plant, where he has been manager since 1940. He has been a director of the company since July 1949 and a vice president since March 1950. He has been with Wyatt since 1928.

John A. Wilson, vice president, who became manager of the Dallas plant in the series of promotions, moved up from works manager there. He has been with Wyatt since June 1933, and a vice president since February 1952.

New Graver Sales Representative

H. T. Sulcer, vice president and general manager of Graver Water Conditioning Co., New York, has announced the appointment of the Frontier Engineering Services Co. of Salt Lake City, Utah as a new representative in the northern and western parts of Wyoming, most of Nevada and all of Utah. They will handle Graver's complete line of industrial, municipal and industrial waste treatment equipment.

Orders Big Tow Barge

Tide Water Associated Oil Co. has ordered what is believed to be the largest coastwise oil-carrying tow barge in the world. It will be 290 feet long, 50 feet wide, and have a draft of 18 feet 7 inches. Its 14 separate cargo tanks will have a capacity of 48,100 barrels.

Aviation Spirit Pump
Eminently suitable for handling spirits and other volatile fluids, this Screw Displacement Pump is of the all round clearance design and is capable of working with a high suction lift. The flow is practically pulseless and the unit self priming.
STOTHERT & PITT LTD BATH ENGLAND
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BRUCE WENTNER, party chief on GSI field party 330, adds to his technical knowledge through GSI's voluntary Correspondence Training Program. GSI supervisors, party chiefs, computers and other GSI technical men throughout the world are enrolled in this unique "post graduate" course in geophysics. Wherever they may be working, the program enables them to keep abreast of developments in geophysical techniques and to improve their professional and technical proficiency. They study on their own time; they are men deeply interested in their profession. Their study and their interest help guarantee the traditional high quality of geophysical data furnished by a GSI survey. *Result to you:* more useful information for finding a world of oil.

1930 ☆ 1955 GSI 25TH ANNIVERSARY ®

GEOPHYSICAL SERVICE INC.

5900 LEMMON AVENUE • DALLAS 9, TEXAS

Finding a World of Oil for a Quarter-Century

To Build Platformer

The Aurora Gasoline Co. is installing the world's first UOP Rexforming unit. It will be capable of producing over 100 octane premium gasoline. An existing UOP Platformer will be converted to a Rexforming unit by addition of the new selective octane extraction process which separates the highest octane components from Platformate, returning the remainder to the reactors of the Platforming unit for further upgrading. The Rexformer will have a design capacity of 5,500 b/d of fresh feed. It will be ready for operation by the end of this year.

New District Office

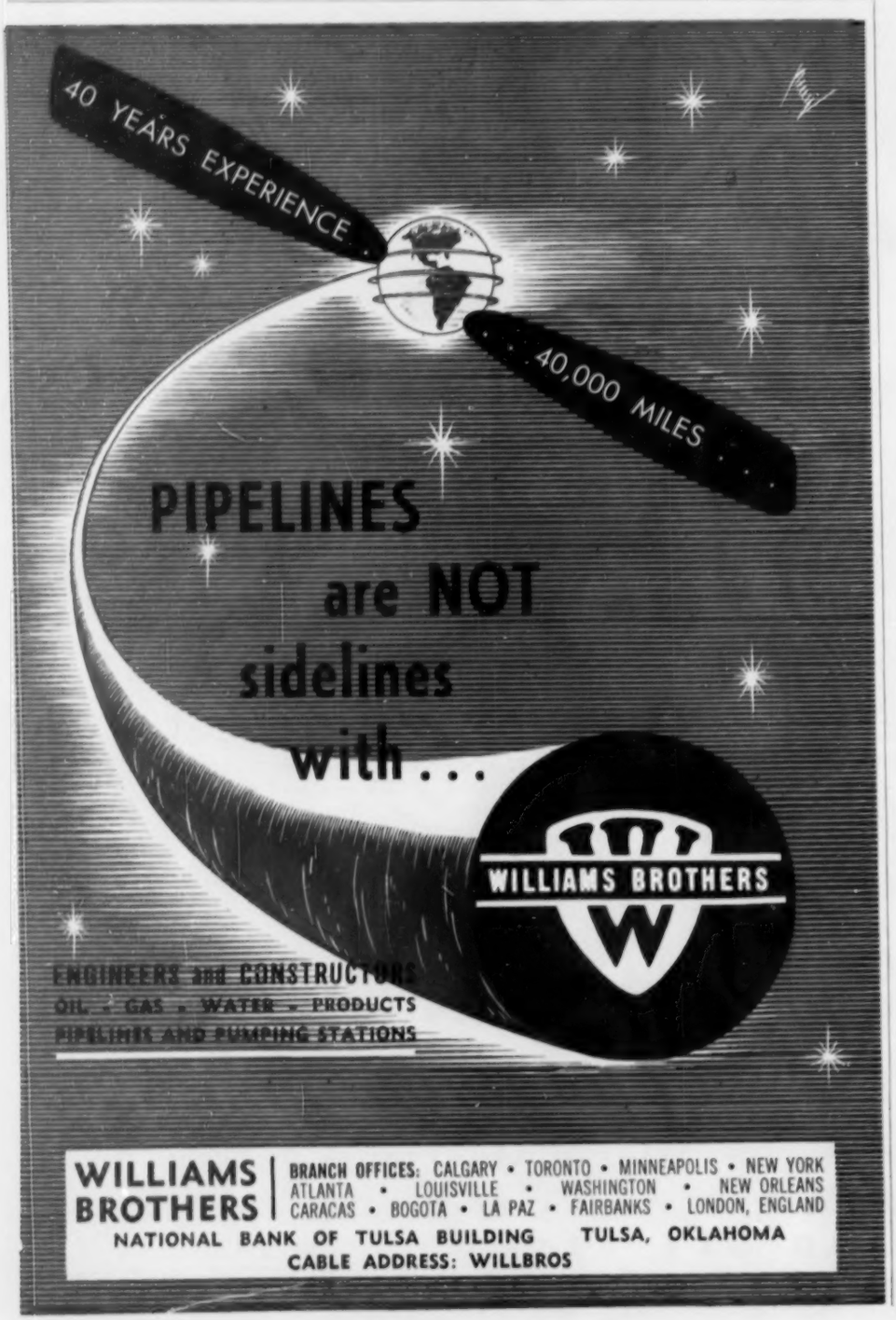
Otis Pressure Control, Inc., has opened a district office in Lindsay, Oklahoma, at 813 West Cherokee Place. Louie Payne and Raymond Fitzpatrick are in charge of the branch.

Cooper-Bessemer Promotes Lambert

T. M. Lambert, Jr., has been appointed manager of the Shreveport branch office of The Cooper-Bessemer Corp., Mount Vernon, Ohio. He succeeds the late A. K. DeFrance. Mr. Lambert will direct both sales and application engineering of engine-driven and motor-driven compressors, as well as diesel, gas-diesel and spark-ignited gas engines.

New McCullough Branch in Montana

I. J. McCullough, president of McCullough Tool Co., has announced the opening of a new service branch at Baker, Montana. The company will provide radiation logging, bullet and fishing tool services from this new location. R. D. McClanahan has been transferred from McCullough's Williston, N.D. branch to serve as manager of this new service station.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New FWD "Teracruzer" developed for transportation over difficult terrain.

FWD Teracruzer

A huge new experimental cargo and personnel carrier that glides over any type of terrain on eight giant air pillows has been developed by the Four Wheel Drive Auto Co. The "Teracruzer" is the first vehicle manufactured expressly to utilize the new, extremely-low pressure pneumatic tire bags developed and produced by Goodyear Tire and Rubber Co. It was designed and built by FWD in cooperation with the Army Ordnance Corps.

The "Teracruzer" is engineered for driving over rough and rocky terrain, over soft and unstable ground, through sand, snow, marsh, ice and swamp, up steep inclines and along difficult side slopes. The vehicle is supported by eight Goodyear Rolligon tires each 3½ feet in diameter, five feet long, and inflated to only three to five psi.

Classified at 40,000 pounds gross vehicle weight, the FWD carrier has a load range of 7 to 10 tons. A 250-gallon aluminum gas tank is mounted behind the cab. Power is supplied by a 340 hp Continental motor. The cab is supplied with a 60,000 Btu heater for arctic service.

The vehicle has a central inflation system which permits the driver to increase or reduce air pressure in the individual bags en route. Controlled walking beams allow the driver to keep the load distributed uniformly on each pair of tire bags when compact terrain is being traversed and permits tilting the front bags upward to throw vehicle weight on the rear bag of each pair when going over snow or soft terrain, with the front bag acting as a compactor in such case.

Though the bags are held in position by eight individual axles, they are driven by rotating rubber-coated tubular steel rollers which come in direct contact with the top surfaces of the bags. Each bag is driven by six rollers and the roller surfaces are machined in a pattern which matches the Rolligon lugs, providing a rubber gear action between roller and bag instead of a simple friction contact. Engine power is transmitted to all the rollers by means of four main drive shafts, each operating a set of 24 driver and idler gears to propel 21 rollers and thus two bags. Unified steering of all four front bags is provided. The two rear frameworks, controlling the other four bags, are affixed in stationary position to the main chassis. Hydraulic steering with a curved hoop tiller bar gives the vehicle a 50-foot turning radius.

The carrier has an Allison torque converter and automatic transmission. Maximum speed is 25 mph.

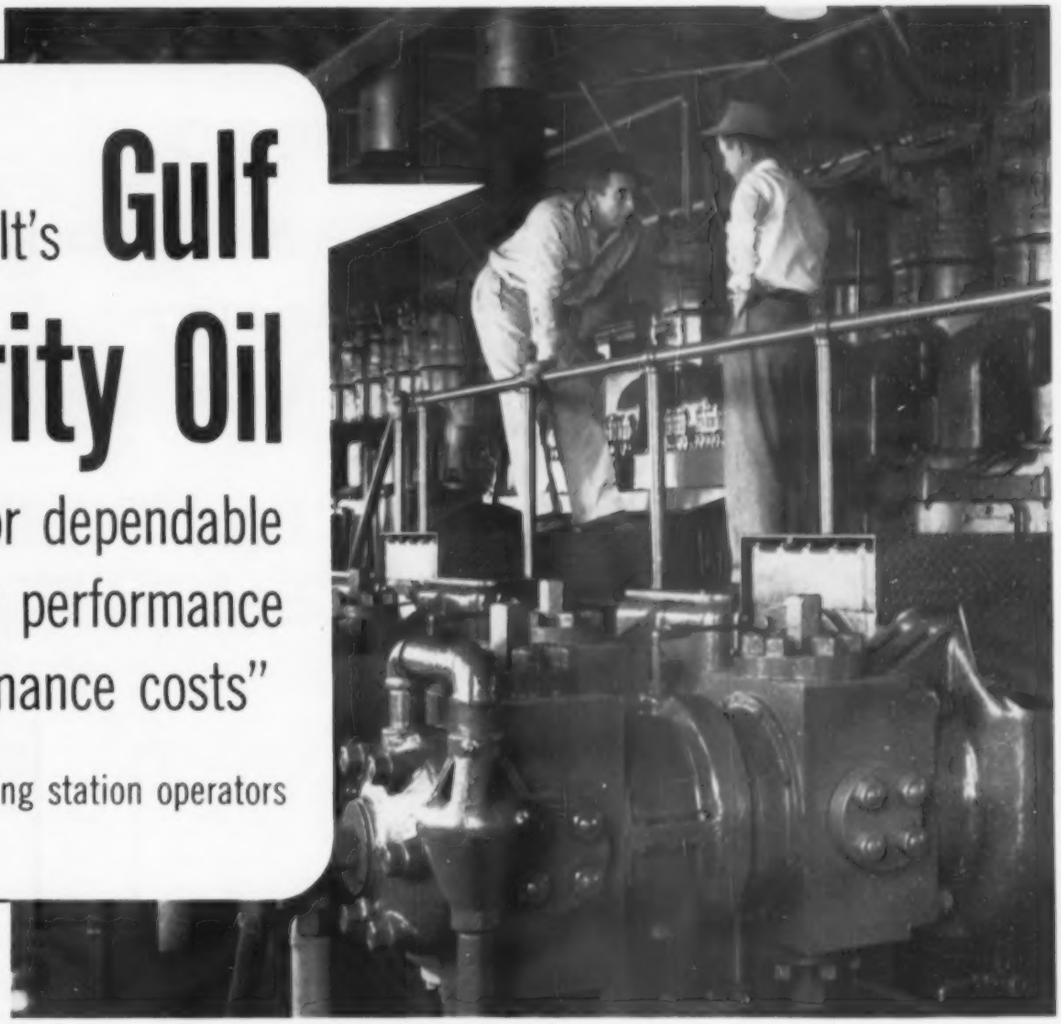
Multi-Purpose Valve Lubricant

A new multi-purpose valve lubricant with an unusually wide field of applications and record temperature range has been introduced by Rockwell Manufacturing Co. as Rockwell-Nordstrom No. 555 lubricant. It offers good metal-wetting qualities at both sub-zero and highly elevated temperatures and is unusually resistant to mixtures of hydrocarbons in both acid and alkaline solutions.

Said to be suitable for a wider range of services than any plug valve lubricant now on the market, the "555" completely replaces four other lubricants in the Rockwell-Nordstrom line: 542, 546, 548 and 654. Efficient temperature range is from —40° F. to 500° F. in bulk form and —20° F. to 500° F. in stock form.

"It's Gulf Security Oil for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

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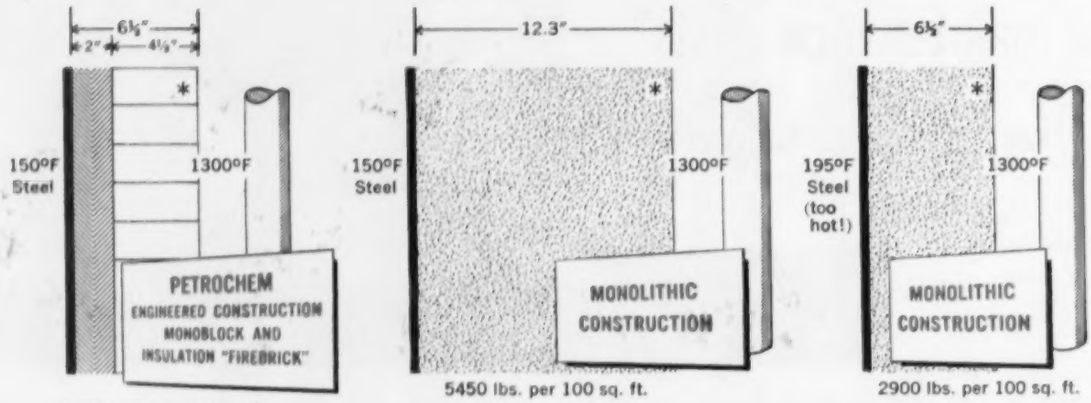
The wall construction of all Petrochem-Isoflow Furnaces is designed for 150°F maximum outside shell temperature.



1250 lbs. per 100 sq. ft.

5450 lbs. per 100 sq. ft.

2900 lbs. per 100 sq. ft.

*Based on B & W values.

The Petro-Chem design provides a thoroughly engineered wall construction. It is built with two tiers of monoblock supported on 18 inch centers and a circular arched wall of insulating firebrick. The inside of the steel shell is protected from the possibility of corrosion by a one-eighth inch thickness of Staylastic cement. This type of construction, independently supported monoblock and the circular arch of firebrick, bonded with Smoothset mortar, assures optimum efficiency and minimum maintenance.

The use of monoblock and insulating firebrick laid as a circular arch provides many advantages over a one-piece monolithic lining, including:

1—Low weight, 2—Low heat conductivity, 3—High hot crushing strength, 4—Low expansion coefficient, 5—Resilient compressible backing, 6—Long life, 7—Nil maintenance.

Also, this construction has low heat storage capacity, speeds both heating and cooling. Its light weight requires less concrete foundations and steel supports.

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NGAA to Issue "K" Value Book

A newly appointed committee has just arranged for the publication of a book of vaporization-equilibrium constants charts, according to a recent announcement by Frank M. Perry, president, Natural Gasoline Association of America and vice president of Cities Service Oil Co., Bartlesville.

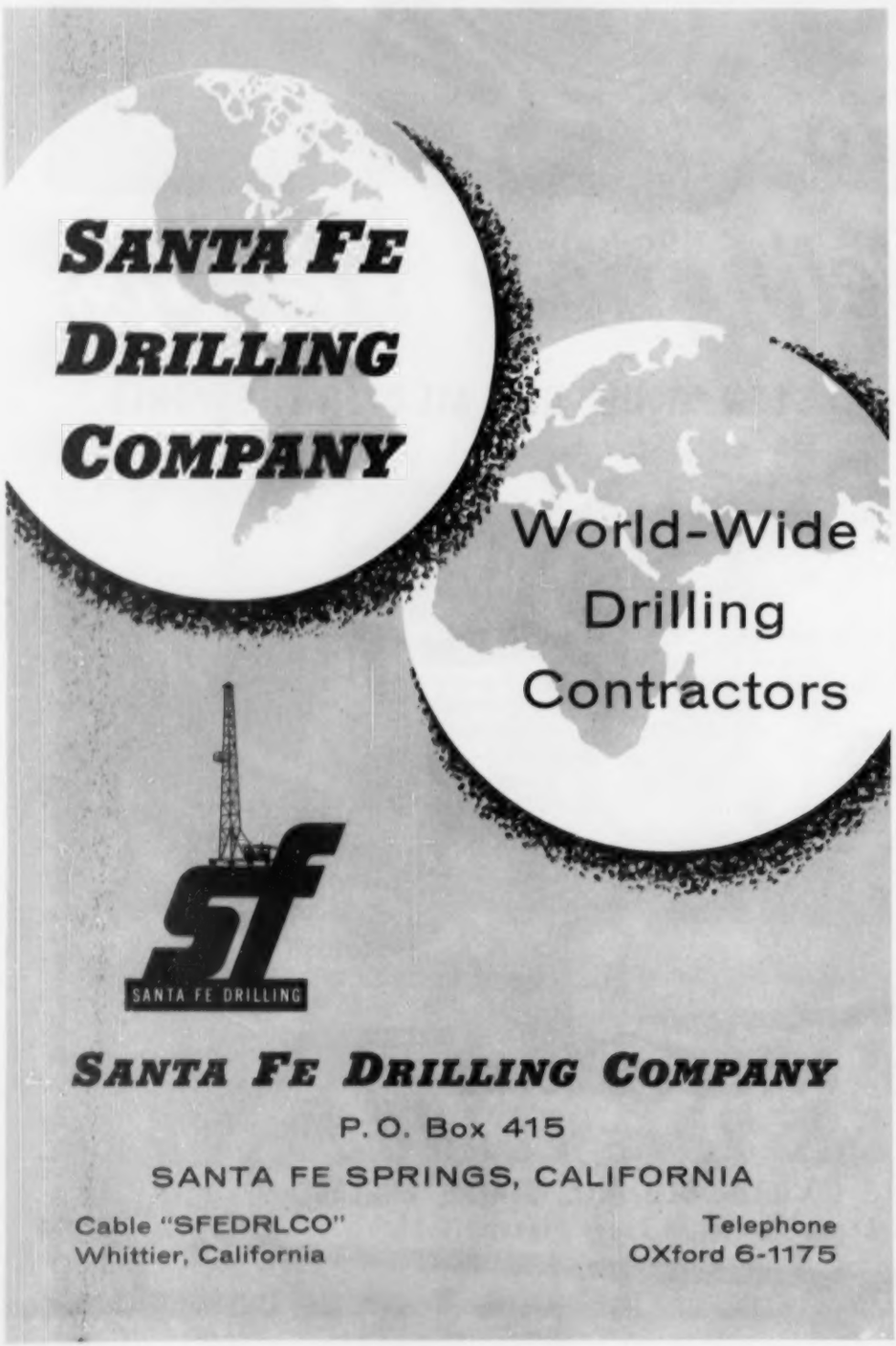
Members of the group are Dr. Elliott Organick, Union Producing Co., Shreveport, La., chairman; Dr. C. L. DePriester, California Research Corp., La Habra, Calif.; Karl H. Hachmuth, Phillips Petroleum Co., Bartlesville, Okla.; J. W. Kilmer, Stanolind Oil & Gas Co., Tulsa, Okla.; Dr. Byron B. Woertz, The Pure Oil Co., Crystal Lake, Ill.; and Henry H. Rachford, Humble Oil & Refining Co., Houston. The book will be issued as a ring binder with 250 8½" by 11" charts, covering methane through decane and including data for nitrogen, CO_2, H_2S, etc., with pressure ranges up to 20,000 pounds.

New McCullough Branches

The McCullough Tool Co. has opened new branches at Grand Junction, Colo., Westhope, N. D. and Carmi, Illinois. P. D. Vollum has been appointed manager of the Westhope branch, transferring from Williston, N. D. V. J. Sanders, formerly manager of McCullough's Newcastle branch, has been transferred to Grand Junction as branch manager. He has been replaced at Newcastle by William Morely, former line truck operator at Newcastle. R. B. Bown has been transferred from Houston to open the new Illinois office.

Platinum Catalyst

Socony Mobil Oil Co. has reached an agreement with Baker & Co. under which Sinclair-Baker platinum catalyst will be supplied for the operation of Sovaforming units. Two Sovaformers now are on stream and six are under construction.



Chemical Tubing Cutter

The McCullough Tool Co. and the Pennsylvania Salt Manufacturing Co. have announced the successful development of a chemical method of cutting tubing in oil wells. Halogen fluorides are employed for the cutting. Special tools have been developed for the application.

During the past year the chemical cutter for 2 and 2½-inch tubing has been employed successfully in many commercial operations at depths of a few hundred to many thousand feet, and the McCullough organization is getting geared production-wise to meet the demand for this tool. In addition, a chemical cutter for casing has been developed and will be available for commercial use in the near future. Halogen fluoride perforating tools have already been designed which are claimed to show advantages over bullet and jet perforators. Research also is being conducted on the development of a tool for drilling wells through extremely hard formations, an operation which is now slow and expensive with diamond bits.

Collaborators in the new development were McCullough Tool Company's W. G. Sweetman, director of explosive research, and Pensalt's research team of John Gall, Henry Miller, and Fred Loomis, members of the organization which developed one of the earliest successful fluorine cells and made the first shipments of anhydrous hydrogen fluoride and of elemental fluorine.

For tube cutting use, the chemical is contained in a heavy-walled cylinder equipped with a pressurizing chamber and a firing head with appropriately spaced orifices. The assembly, lowered into an oil well by a McCullough service truck, is positioned accurately and held against powerful thrusts by specially designed latches. Upon electrical impulse through the electronic panel and conductor cable, the chemical is ejected under enormous pressure against the inner pipe wall, which it penetrates in a fraction of a second.

By changing the placing of the openings, the tool makes a clean cut without the flaring produced by explosive methods. It also perforates a smooth, burrless hole.

Several years were spent by researchers for the two companies in the development of safe equipment for storage, shipment and application of the chemical. The problems met were difficult because of the properties of the fluorides which cause immediate ignition of organic materials and react explosively with silicon compounds. Attention was centered in equipment design on the application of pressures to accelerate the rate of release of chemical energy and the concentration of this energy at desired points.

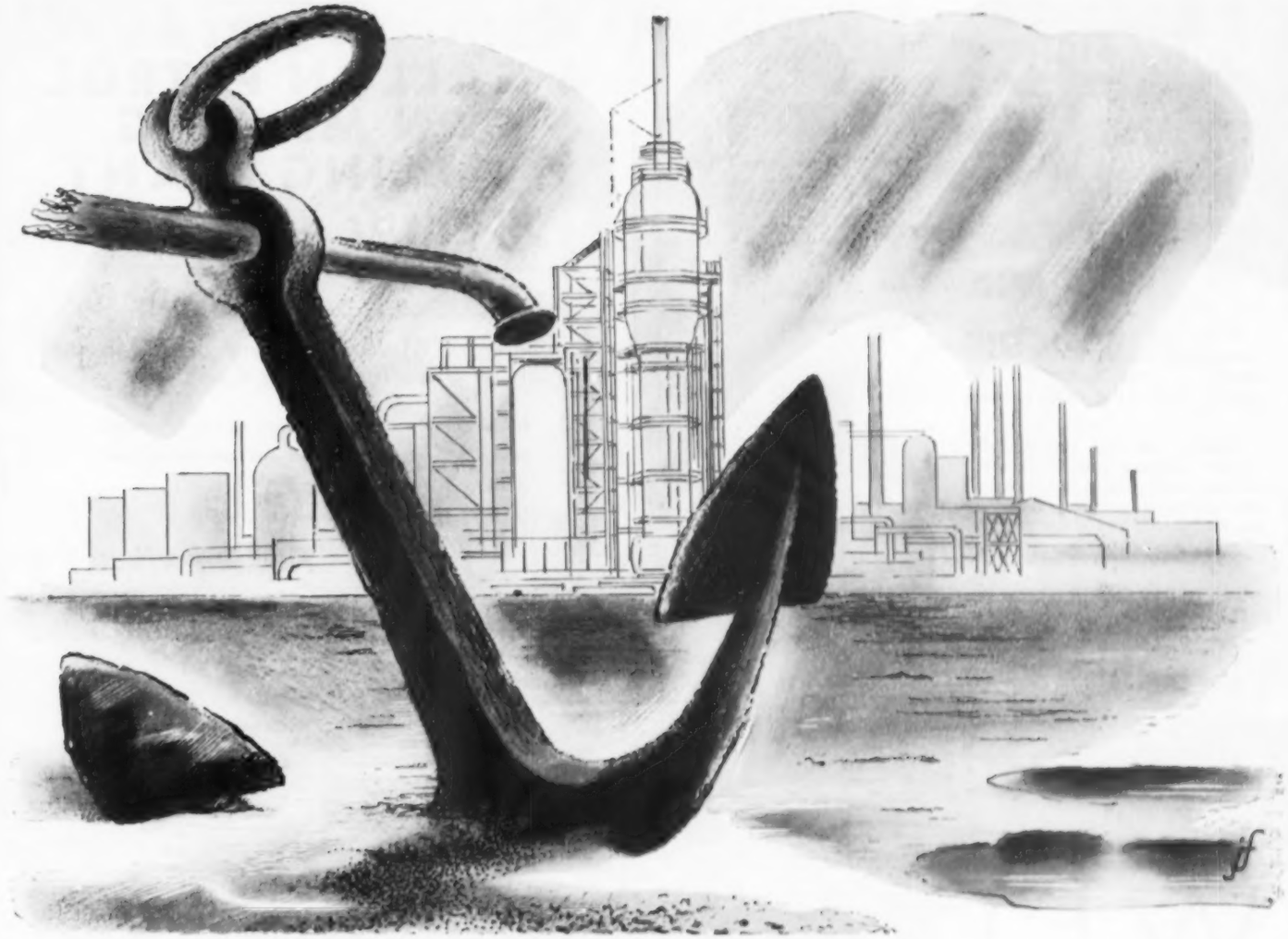
Acquires Varian Magnetometer Rights

A contract giving exclusive world-wide rights for the Varian Earth's-Field Magnetometer has been granted to Hycon Aerial Surveys of Pasadena, Calif. The Varian Magnetometer uses the inherent properties of hydrogen nuclei in water to detect and measure minute changes in the earth's magnetic field. First display to the public of the new instrument was at a recent meeting of the American Society of Photogrammetry.

It needs no gyroscopic stabilization to obtain absolute readings of total field. The "bird" that is trailed behind the survey airplane measures total magnetic field without regard to direction. The "bird" that feeds basic information to the recording equipment in the airplane is little more than a jar of water with a coil wrapped around it housed in a streamlined cone. Relatively inexpensive to build, there is negligible loss if the pilot comes too close to the ground and smashes the jar of water and coil.

Gun Perforation Booklet

Schlumberger Well Surveying Corp., Houston, has published a pocket-size booklet titled "Deeper Penetration Perforating." Data is presented in brief tabular and diagramatic form to assist the operator in selecting the right gun for specific applications. Perforation depths of various diameters are shown for the Super Gun, Shaped Charge Gun, Expendable Shaped Charge Gun and Expendable Swing Gun. Recommendations are given for control of perforating depth. Copies of the booklet are available on request.



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Kwinana Refinery was designed by the M.W. Kellogg Company and their British subsidiary, the Kellogg International Corporation, for Australasian Petroleum Refinery Limited, an associate of the British Petroleum Co. Ltd. Actual construction of the £A40,000,000 project was entrusted to a consortium of three British contractors known as the Kwinana Construction Group. One member of the consortium is D. & C. and William Press Limited.

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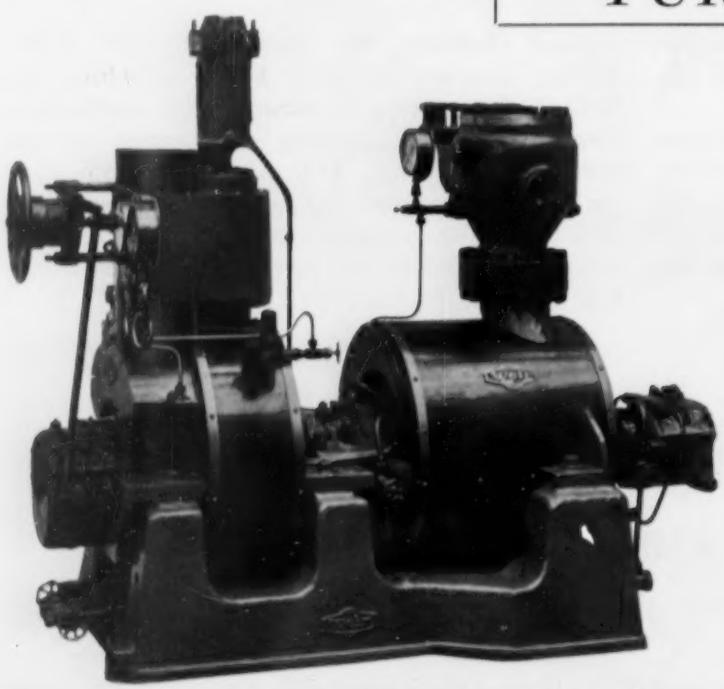

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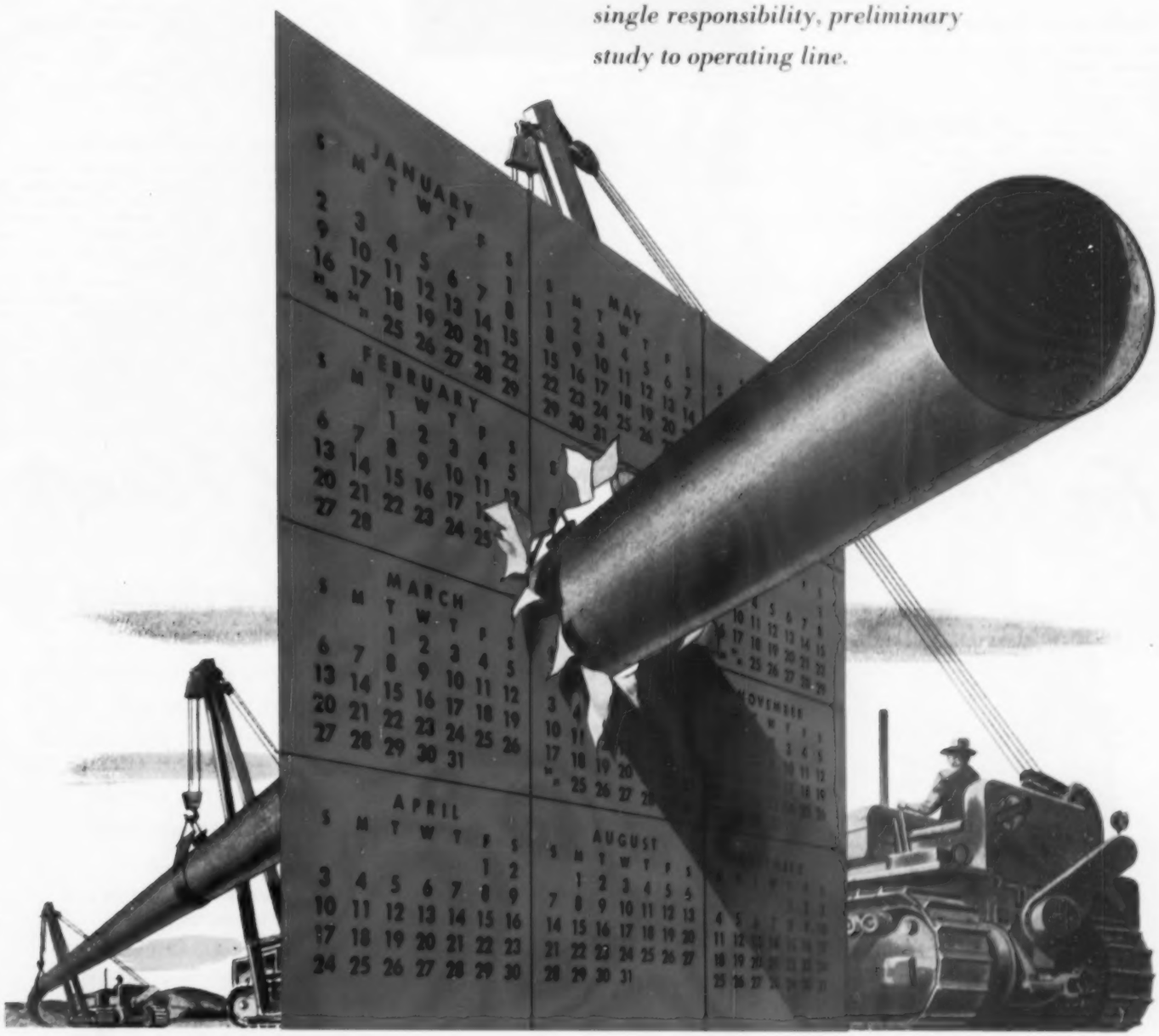

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Joins World Petroleum

Gordon H. Barrows has been appointed managing editor of World Petroleum. He succeeds J. C. Chatfield, who has been made editor following the partial retirement of E. W. Mayo who has been principal editor for the past 25 years.

Mr. Barrows has spent his entire working life in the oil industry. He began as a roustabout in the Badger Basin field in Wyoming. During the past three years he has visited some 50 countries in connection with his duties with Foreign Petroleum Consultants of Washington, D. C. Previously he was with Richmond Petroleum Co. He holds degrees from the University of Wyoming and the School of Advanced International Studies of Johns Hopkins University.

Drilling and Production Practice

The division of production of the American Petroleum Institute, Dallas, announces availability July 15, 1955, of the 1954 edition of *Drilling and Production Practice*, at $5 per copy, postpaid within the United States and for foreign shipment, $5.25. The volume (clothbound, approximately 300 pages) contains 28 pages, including a symposium on offshore operations comprised of eight pages, specially selected from those presented during 1954 at division of production district meetings and annual meeting group sessions. A bibliography of all papers presented at district meetings is also included.

Heads Market Research

Jack D. Bateman, senior market analyst at Rockwell Manufacturing Co., has been named manager of market research to succeed A. Clark Daugherty, who has been assigned other corporate duties in addition to maintaining over-all supervision of market research and public relations.

G. H. Barrows

Cat Cracker Film

What is believed to be the first movie ever made that effectively shows what happens inside a cat cracker has been produced by The M. W. Kellogg Co.

Shot in color on 16mm film, and running 15 minutes, "The Orthoflow Fluid Catalytic Cracker" is done in animation. The film gives a graphic description of the various types of catalytic cracking units and how the older types were improved. The complicated functions of the cat cracker are so clearly pictured and explained that the film can be used for educational purposes.

"The Orthoflow Fluid Catalytic Cracker" can be obtained by writing to the Film Division, Advertising Department, The M. W. Kellogg Co., 225 Broadway, New York 7, N. Y.

Petroleum Chemicals Officers Announced

Officers of the recently organized Petroleum Chemicals, Inc. have been announced jointly by Cities Service Co. and Continental Oil Co., both of whom own a 50 percent interest in the new petrochemical firm.

W. Alton Jones, New York City, Cities Service Co., will serve as chairman of the board of Petroleum Chemicals, Inc. L. F. McCollum, Houston, Continental Oil Co., has been elected president.

Other officers are: A. P. Frame, New York, Cities Service, vice president; Harold G. Osborn, Ponca City, Okla., Continental Oil, vice president; B. R. Johnstone, New York, Cities Service, secretary and treasurer; Keith Blinn, Houston, Continental Oil, assistant secretary; and C. B. Wedum, New York, Cities Service, assistant secretary.

Petroleum Chemicals, Inc., which is headquartered in New York, recently has offered to purchase the government-owned butadine plant at Lake Charles from the Rubber Facilities Disposal Commission.

Deep Rock Changes Name

Deep Rock Oil Corp., has approved a change in the name of the corporation to Crescent Corp. The present director of Deep Rock will continue with Crescent. W. H. Garbade continues as president, with W. F. Styler, Jr., as vice president and treasurer, and C. A. Houy as vice president in charge of exploration and production.

H. A. Tallman continues as manager of the legal department and N. K. Anderson as director of research and engineering. The exploration and production division will operate with H. R. Bolton as manager of production, R. B. Hurlbutt, Jr., as chief geologist, A. D. Benedict as manager of the land department, and J. M. Moore as office manager and purchasing agent.

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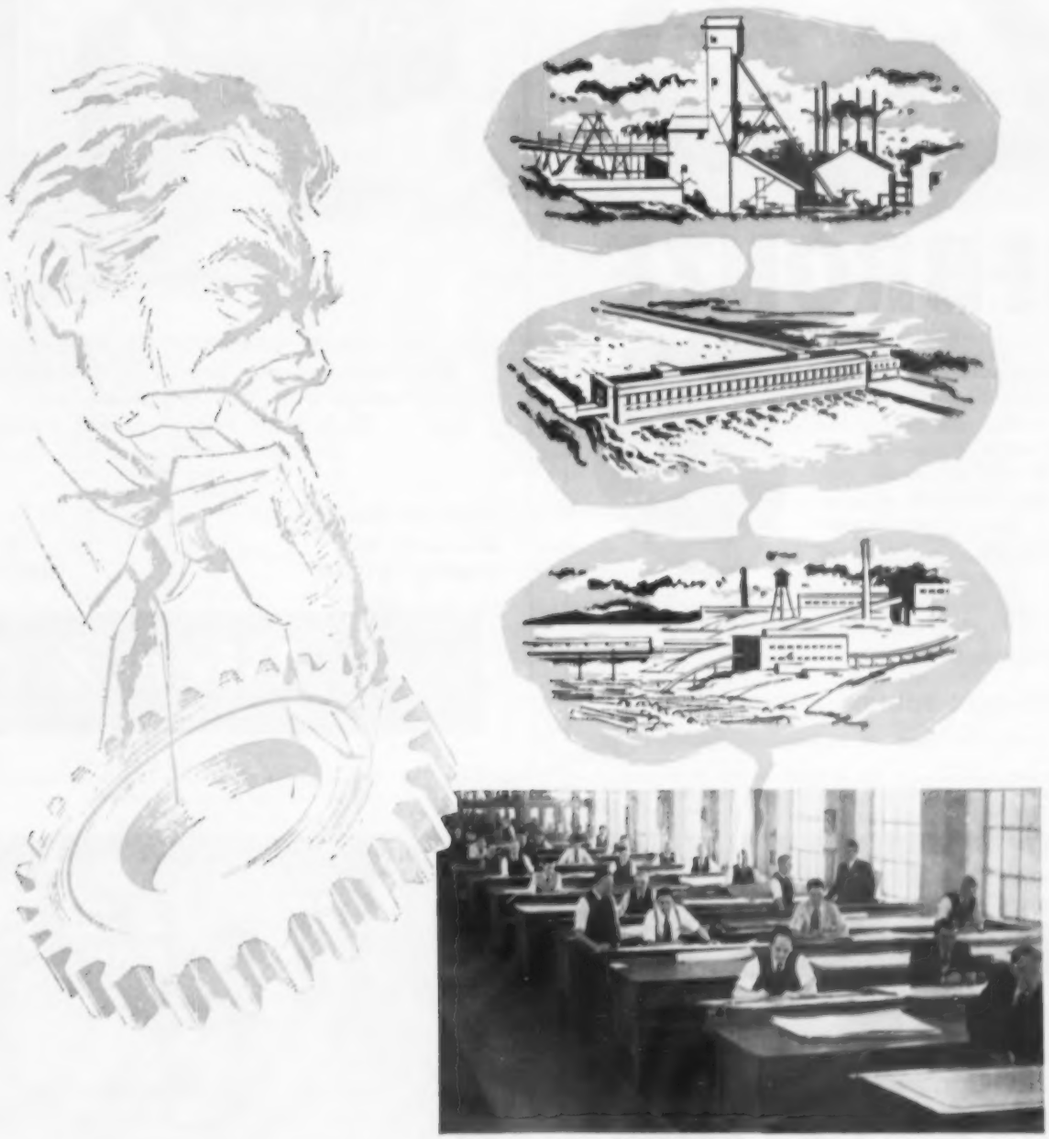

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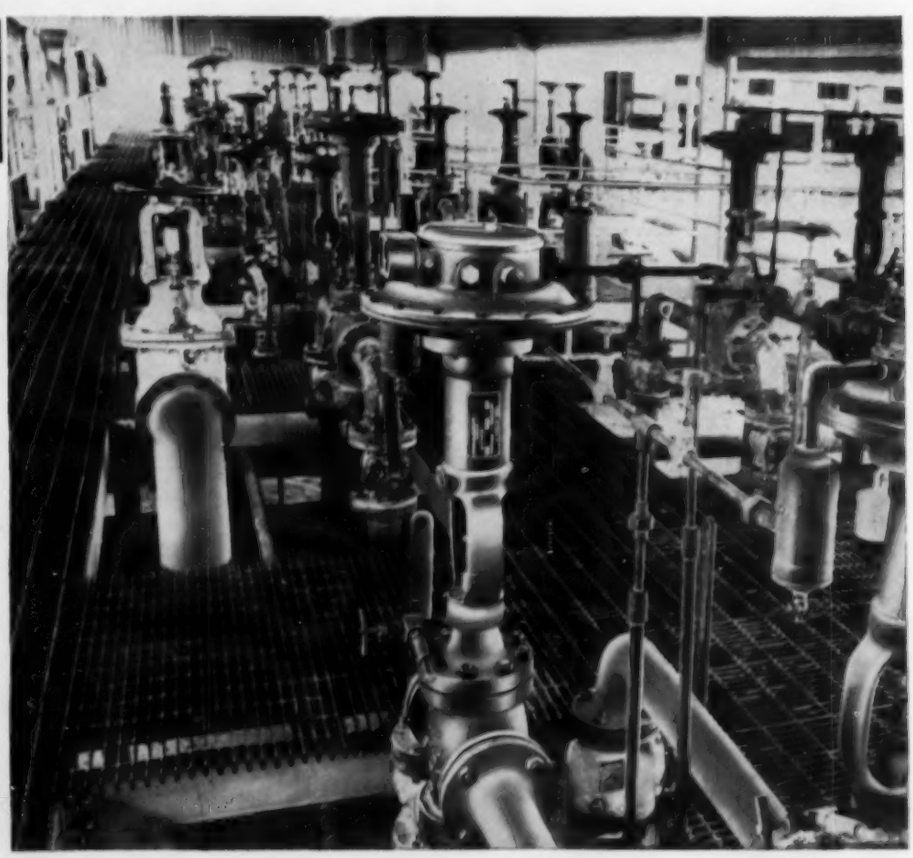

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UOP-Polychem Merger

The merger of Universal Polychem Co., a wholly owned subsidiary of Universal Oil Products Co., into the parent company, effective as of August 1, was announced by David W. Harris, president of UOP. All manufacturing activities conducted by Universal Polychem at McCook, Ill., and Shreveport, La., are carried on as a separate division of UOP without change in policies or personnel. The Polychem division will manufacture various types of catalysts, inhibitors, and other forms of additives.

M. R. Schrein has been elected a vice president of Universal with responsibility for manufacturing. He was vice president and general manager of Universal Polychem. Also elected by the UOP board were Frank O. Byrne and Thomas B. Drake as assistant secretaries; D. A. Cameron as comptroller; and A. W. Lindahl as assistant comptroller.

McCullough Neutron Generator

A new heavy particle generator and accelerator instrument, the McCullough Neutron Generator, has been developed by McCullough Tool Co. and operated successfully to test an Atlantic Oil Co. Signal Hill well. The new instrument generates 14 million electron volt neutrons and accelerates them to over 150 million feet per second.

The generator is reported to produce 14 Mev neutrons of one specific energy band. This compares with a mean energy range of 2 to 3 Mev from present polonium-beryllium sources.

The neutron generator is lowered into the well bore on the electric conductor cable from a McCullough Service truck. Within the generator, heavy particles are accelerated to produce a vast number of high energy neutrons which penetrate deep into the surrounding earth formations. Reactions are detected by the McCullough scintillation spectrometer. It is possible to pulse the accelerator so that bursts of neutrons can be sent out and the short lived effects on the formation read.

McCullough Tool Co. first ran the scintillation spectrometer in oil wells as early as 1950, and both naturally occurring and induced activation spectra were recorded. Since then it has been run in a great many wells.

Dual String Christmas Tree

A new dual string Xmas tree, assuring positive control during all completion operations, has been announced by Cameron Iron Works, Inc., of Houston, Texas. The new Cameron "DC" dual completion tree allows the operator to run parallel strings in precisely the same manner as single strings, independently or simultaneously, and with the protection of the Cameron closed-pressure system of well completion. Compactness of its component parts permits two strings of 2⅜-inch OD upset tubing to be run in 7-inch casing with 6-inch heads.

P. E. Tobin

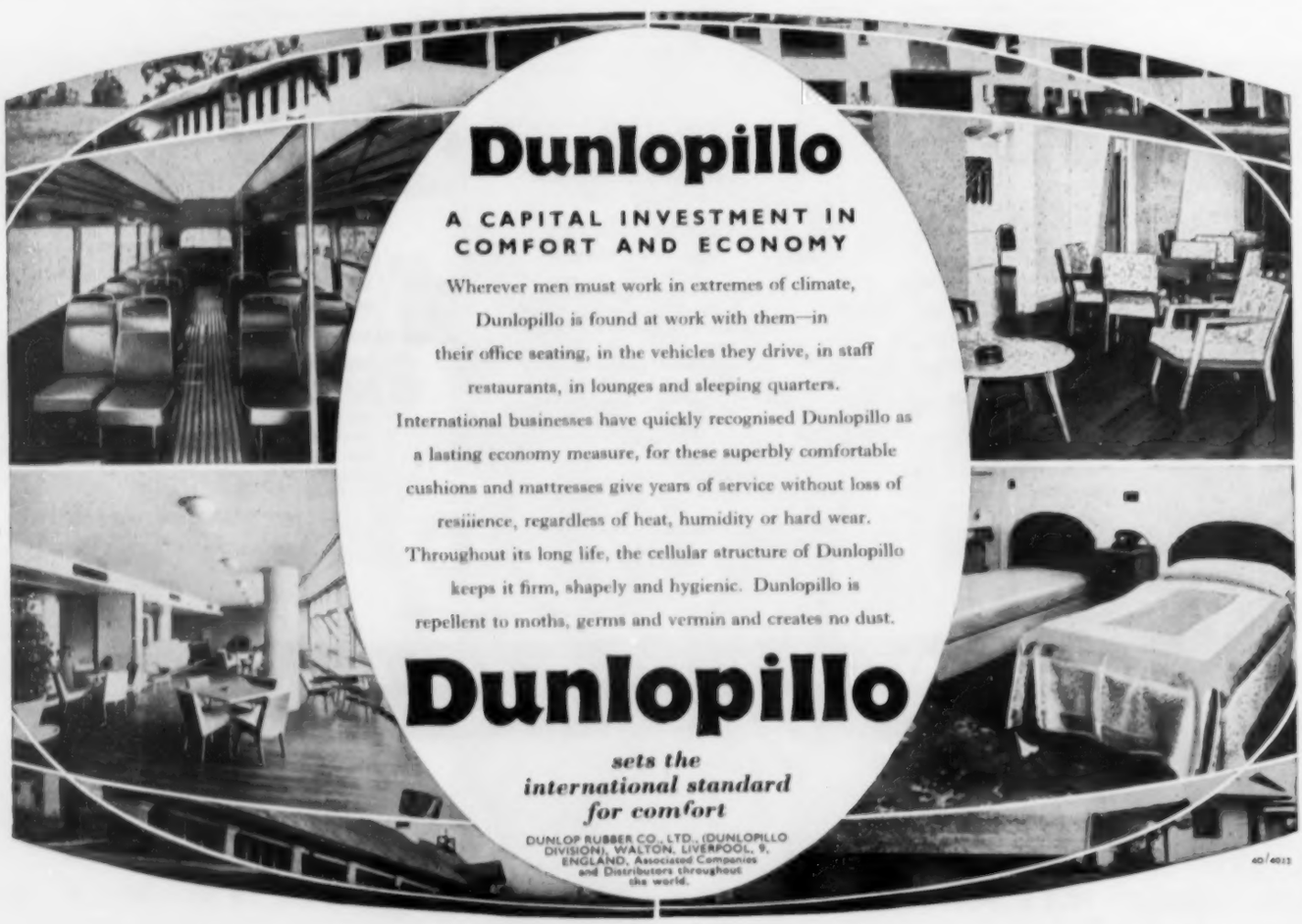
Heads White Motor Sales

P. E. Tobin has been appointed general sales manager of the truck division of The White Motor Co., Cleveland, it was announced by J. N. Bauman, executive vice president. Mr. Tobin has been North Atlantic regional manager for White in New York City.

Heads Pipelife Corp.

Roscoe J. Lyons has been appointed president of Pipelife Corp., which is presently moving to Tulsa from San Angelo, Texas. The company is engaged in internal pipe line coating. He succeeds John Boles, who remains a director.

Mr. Lyons resigned as western division manager with Kobe.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MEXICO'S MAIN ACHIEVEMENTS IN 1955

INSTALLATIONS THAT HAVE BEEN COMPLETED IN 1955 AND THOSE TO BE COMPLETED WITHIN THIS SAME YEAR BY PETROLEOS MEXICANOS, AS PART OF THE VAST PROGRAM OF THE MEXICAN OIL INDUSTRY; THE RELATED INVESTMENTS BEING AS SHOWN AT RIGHT.

REFINING CAPACITY

LOCATION	1955 BARRELS PER DAY
REYNOSA	10.000
ARBOL GRANDE	44.000
MATA REDONDA	22.000
CIUDAD MADERO	88.000
SALAMANCA	50.000
ATZCAPOTZALCO	100.000
POZA RICA	5.000
MINATITLAN	50.000
TOTAL	369.000

1- Lube-Oil and Wax Manufacturing Plant at Salamanca, Gto. Finished in January 1955 at a cost of **$ 31.000,000**

2- Processing capacity of the "18 de Marzo" Refinery in Mexico, D. F., has been increased from 50,000 to 100,000 barrels per day. The additions to this refinery were completed in July 1955 at a cost of **$ 7.150,000**

3-Construction of 18" crude oil pipe line between Poza Rica, Ver. and México, D F., was finished July 1955 Approximate cost **$ 5.945,000**

4- Propane gas pipe line from Poza Rica, Ver. to Mexico, D. F., to be completed in September 1955 Approximate cost **$ 1.015,000**

5- Additions to installations at Poza Rica, to increase the production of natural gasoline, sulphur and dry gas. Also the construction of a water purification plant, for injection into the reservoir. Increase in gas repressuring operations. These projects were completed in April 1955 at a cost of **$ 23.810,000**

6- Additions to installations at Minatitlan Refinery, to increase capacity from 25,000 to 50,000 barrels per day, including the construction of a T.C.C. cathalythic plant and a polymerization unit. These plants will be finished in October 1955 Cost **$ 12.384,000**

7- 300.000,000 Cu.Ft./day absorption plant at Reynosa. Increase to 10,000 barrels per day of the existing refinery capacity with the addition of a thermal cracking unit. Work to be finished in September 1955 Cost **$ 9.280,000**

8- Products pipe line between Tampico and Monterrey. Capacity 25,000 barrels per day. To be finished in December 1955 Cost **$ 9.100,000**

9 - Angostura to Veracruz 20" crude oil pipe line to be finished in October 1955 Cost. **$ 2.160,000**

10- Products pipe line between Lagos de Moreno, Jal. to Aguascalientes terminal plant with a capacity of 73,500 barrels to be finished in October 1955 at a cost of **$ 933,000**

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Six points of a Star Performer

1. Self feeding parallel rolling type.
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5. High resistance to wear.
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Osborn 'Titanic' Tube Expanders for Oil Refinery Fittings can be recommended with every confidence.

The High Quality Alloy Steel from which they are made is an Osborn product carrying a world wide reputation for its excellence. They are built by craftsmen, and backed by vast experience as toolmakers.

All major types of self feeding Parallel Rolling Type Expanders can be supplied, as standard products, and where unusual conditions have to be met, specially designed expanders can be supplied to meet requirements.

In all stages of production constant inspection is made to ensure a first class job, which will give the user maximum efficiency and long service.

When only the best will do specify:

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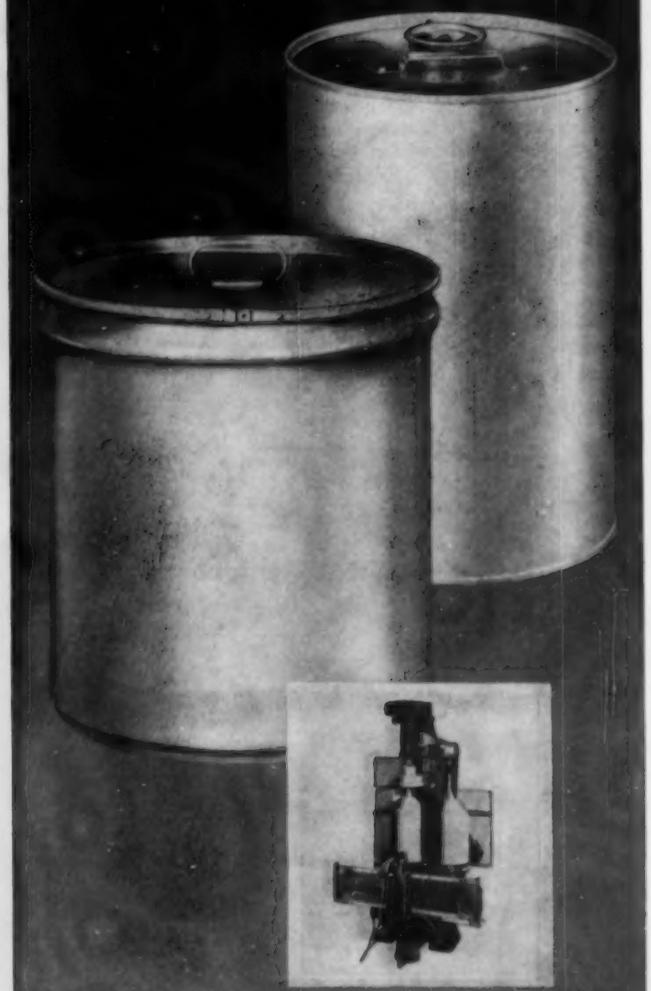

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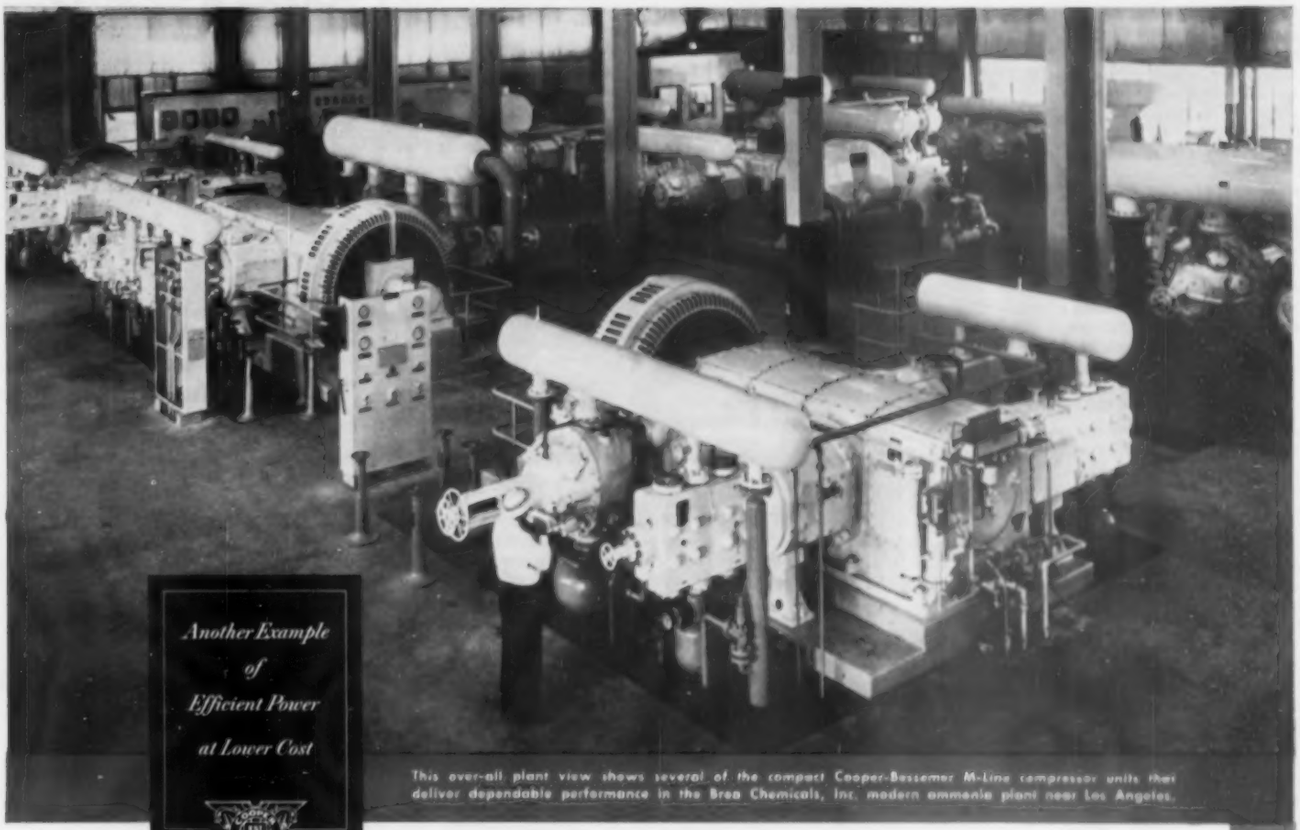

Another Example of Efficient Power at Lower Cost

This over-all plant view shows several of the compact Cooper-Bessemer M-Line compressor units that deliver dependable performance in the Brea Chemicals, Inc. modern ammonia plant near Los Angeles.

HERE'S MULTIPLE-SERVICE FLEXIBILITY IN MODERN AMMONIA PRODUCTION

. . with Cooper-Bessemer JM Compressors

● Twelve Cooper-Bessemer JM compressors, totaling 17,500 horsepower, are doing an efficient, economical job of handling a wide range of compressor services in the Brea Chemicals, Inc. 13-million-dollar ammonia plant near Los Angeles.

JM-4's for air, ammonia, mixed gas, hydrogen and recycle service, and JM-6's handling nitrogen compression, offer important savings to this producer of 235 tons of ammonia daily.

Here, to list but a few, are reasons why Brea, like so many other modern chemical producers, benefits from Cooper-Bessemer's century of compressing experience: there's extreme flexibility to handle a wide range of pressures and different gases, advanced design and metallurgy afford unusual strength and rigidity, there's five-step unloading at constant speed, the crankshaft is a steel forging of exceptionally large diameter thus low unit bearing pressures, compressor cylinder jackets are designed to insure adequate, uniform cooling, and the JM's exceptional compactness does not sacrifice accessibility or ruggedness.

If you're interested in compressing, write or call for full details . . . learn about *all* the plus features of these modern units. The nearest Cooper-Bessemer office will gladly cooperate.

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DIESELS • GAS ENGINES • GAS-DIESELS • ENGINE-DRIVEN AND MOTOR-DRIVEN COMPRESSORS

Book Review

Compressed Air Handbook; 2nd edition; authorized by Compressed Air and Gas Institute; published 1954 by McGraw Hill Book Co., New York; in five separately paged sections; $8.00.

This is a revised and enlarged reference book on all phases of industrial air and gas compressors, compiled from the rich experience of the 22 nationally known firms that constitute the Compressed Air and Gas Institute. Many new illustrations, charts and tables have been added to feature recent advances in centrifugal compressors, new developments in displacement-type compressors, and recently developed maintenance techniques. As is well known, the uses of such compressors in industrial operations are almost infinite, and since the oil industry is much given to handling gases under pressure, petroleum engineers must find a place for this excellent volume on their bookshelves.

Book Review

Some Fundamentals of Petroleum Geology, by G. D. Hobson; published 1954 by Oxford University Press, London; 139 pages; 18s.

In writing this small book, the author has been inspired by a feeling that in preoccupation with the problem of increasing available reserves of oil, the petroleum industry has tended to neglect the study of basic principles and has concentrated on developing new tools of exploration. More recently the increase of knowledge of the world's oil pools has led to revival of interest in the fundamentals. Petroleum geology has become less and less a mere study of structure and more a study of the stratigraphic history of an era, on the principle that the life history of the oil fields is interwoven with the history of the rocks. From that standpoint, Dr. Hobson discusses the nature of an oil accumulation, the reservoir fluids, their composition and properties, the origin of petroleum, migration and accumulation, reservoir pressure, compaction, and hydrocarbons in young sediments.

Book Review

The Chemistry of Petroleum Hydrocarbons, edited by Benjamin T. Brooks, Stewart S. Kurz, Jr., Cecil E. Boord and Louis Schmerling. Vol. II, pp. 448; Vol. III, pp. 690. Published May 1, 1955 by Reinhold Publishing Corp., New York 22, New York. Vol. II, $13.50; Vol. III, $18.00.

These two new volumes of this monumental work continue to follow the line marked out in Vol. I, which is to give precedence to the scientific fundamentals of hydrocarbon chemistry, with minor references to much of the progress engineering, apparatus design, and analytical and testing methods relating to petroleum refining and the many uses of petroleum products. In their effort to keep the work from getting altogether too big, the editors have shied away from discussing the derivatives that are being made from hydrocarbons. What we have, then, is one big treatise on the chemistry of the hydrocarbons themselves as we now know it.

The previously published Volume I contained 21 chapters covering mostly the compositions of gases and liquid hydrocarbons, their physical properties, purification and synthesis.

Vol. II has 16 chapters dealing generally with the mechanisms of the thermal and catalytic decomposition of hydrocarbons and the compositions of the resulting products with consideration of various subsidiary operations such as aromatization, Hydroforming, Platforming and dehydrogenation.

Vol. III, with 22 chapters, continues with the reactions of oxidation, isomerization, chlorination, fluoridation, nitration, polymerization, hydrogenation, condensation, alkylation, substitution and special reactions.

The dust jackets of these volumes display statements by the late Dr. Gustav Egloff to the effect that no one in the oil industry who has to do with hydrocarbons in oil can afford to do without this work. The present reviewer subscribes to that opinion.

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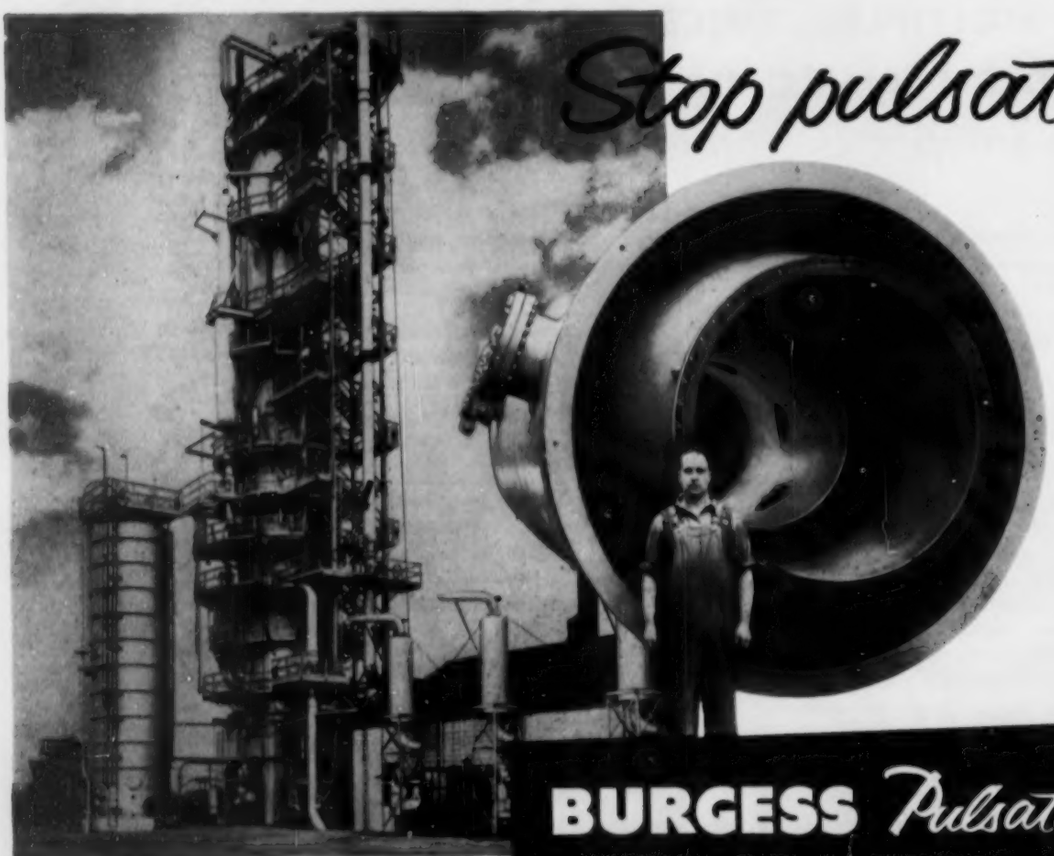
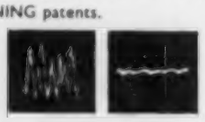
Stop pulsation . . .



Pipes carrying gas and air under pressure from pumps, blowers, or compressors may fail, or require special reinforcement, as a result of surging and the consequent pulsatory vibration. This problem is overcome by fitting BURGESS Snubbers, which convert intermittent flow to smooth flow—and which, by eliminating a cause of line failure, often effect economies by permitting less costly pipes to be used. BURGESS Snubbers are made to the specifications and design of the original American BURGESS-MANNING patents.



Oscilloscope recording shows pulsation (left) and smooth flow attained after fitting BURGESS Snubber (right).

BURGESS Pulsation Snubbers

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SEISMIC GRAVITY MAGNETIC SURVEYS

New Design Floating Roof

Wyatt Metal & Boiler Works, Houston and Dallas, has published a brochure describing a new line of floating roofs now in production. Three new types of floating roofs, licensed under the Joor group of patents, are described. In general these roofs are of the twin-deck, pontoon and pan-type designs.

The roofs are of a rigid design to assure drainage. There is no vapor space beneath the deck to minimize corrosion of the deck plates. The annular space between the roof perimeter and the tank shell is sealed at the oil surface by synthetic-rubber asbestos-cloth sealing material. The sealing mechanism consists of long, heavy galvanized steel shoe plates, and a positive, mechanical expanding mechanism forcing the shoes outward against the shell with uniform pressure over the entire area of the shoe. The design generally reduces evaporation losses at the edges of the roof and lessens the possibility of corrosion in the space housing the sealing mechanism. There are no structures above the roof deck plates to reduce maintenance costs.

White Motor Acquires Diesel Engine Division of National Supply

The White Motor Co. has bought the property, business, inventory and other assets of the diesel engine division of The National Supply Co. William F. Burrows is general manager of the new diesel division with headquarters in Springfield.

Under terms of the purchase agreement, National Supply becomes the distributor for all oil country engines produced by the new division. All other engines will be distributed and maintained by White.

Made Falcon Seaboard VP

Lowell N. Applegate has been named assistant vice president in charge of production for Falcon Seaboard Drilling Co., Tulsa. He had been assistant reservoir engineer on the Gulf Coast area for Phillips Petroleum Co.

O. W. Barnett

Rockwell Names Assistant to Vice President

Orville W. Barnett, manager of Nordstrom valve distribution and oil field sales for Rockwell Manufacturing Co., has been named assistant to the vice president, meter and valve division.

Mr. Barnett will move to the new Rockwell valve plant at Sulphur Springs, Texas, according to Paul Kreuch, vice president. He will continue to promote and co-ordinate oil field sales and will develop a training program for Rockwell and distributor sales personnel and customer representatives.

To Build Platformer

Anderson-Pritchard Oil Corp. will build a 5,000 b/d Platformer at its Arkansas City, Kan. refinery. It is scheduled for completion in late October by Southwestern Engineering Corp., the contractor.

"Drive-In" Portable Rig

Ideco division of Dresser Equipment Co. has developed the "Drive-In" Rambler, a new rig designed for faster rigging up, faster moves and maximum use of all components in servicing, workover and light drilling. Rig, mast, drawworks, engine, and driver's cab have been integrated in a single, self-propelled, 8-foot road width carrier. The same engine, torque converter and transmission serves both highway and oilfield functions of the new portable rig.

All four front wheels have power steering for ease in handling and for a short turning circle. Hoists are available in the 100 to 350 hp input range. Rig air controls are centralized in a remote panel attached to the mast leg. On the highway the driver controls the mobile power with a single hand lever and foot throttle.

Two types of mast range from 65 to 103 feet in height. Both masts telescope in the vertical position. When telescoped and lowered to the over-the-road position, both masts are transported without disassembly and with all lines strung.

New Line Could Serve California

Standard Oil Co. of Calif. has announced plans for expansion of West Texas pipe line facilities to a 20-inch line with an ultimate potential capacity of 220,000 barrels of crude oil daily delivered to El Paso. In an emergency, the expanded line could make crude oil available to be shipped to California by reversing the Southern Pacific Pipe Lines, Inc., petroleum products line now under construction. The Southern Pacific Pipe Lines route will run from El Paso to Phoenix and from the Los Angeles Basin to Phoenix.

Well Stimulation Bulletin

"Chemical Reagents for Oil Well Stimulation" is the title of a new bulletin published by Aquaness Corp., 2005 Quitman, Houston.

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WELDING FITTINGS
The Tubend range of welding fittings meet the requirements of practically every type of prefabricated pipe assembly and the facility, economy and efficiency of fabrication becomes even more marked when working in confined spaces and effecting difficult directional changes.
The Tubend range comprises: elbows, return bends, reducers, tees and caps manufactured under strict supervision to meet the requirements of both British and American specifications.
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Grade	F-3-25 Extra Fine	F-2-25 Fine	F-1-25 Inter-mediate	C-1-25 Coarse	C-2-25 Extra Coarse
Size range by C.A.E.: Wt. %					
0-10 Microns	4	2	1	1	1
0-20 Microns	9	4	2	2	2
0-30 Microns	16	11	6	5	4
0-40 Microns	28	21	12	10	8
. . . and a minimum of coarse particles					
Sieve analysis: Wt. %					
on 100 mesh (149 microns)	0	0	1	1	1
on 140 mesh (104 microns)	1	1	4	6	8
on 200 mesh (74 microns)	4	5	15	22	33

Now Davison has taken the characteristics of High Alumina Catalyst and combined them with the proven advantages of its 13% Alumina Catalyst. This gives you, for the first time, High (25%) Alumina Catalyst with *all* these qualities:

- ***Lower Stock Losses***
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International Sales Organization

Consolidated Engineering Corp. has set up the framework of a worldwide sales organization with appointment of export representatives in 19 countries, it was announced by C. J. Underwood, export manager of the electronic instrument firm. Thirteen European countries will be covered as well as Japan, Australia, South Africa, Egypt, Cuba, and Puerto Rico. The Cuban representative will serve other Latin American countries as well as Cuba.

New Petroleum Cracking Catalysts

As advances in the field of synthetic fluid petroleum cracking catalysts, the Davison Chemical Co. Division of W. R. Grace & Co. has announced two new products, one of high alumina catalyst containing 25 percent alumina as against 13 percent in the catalyst regularly supplied; the other a low density product with important new characteristics. Each is designed for distinctive advantages under specific conditions of refinery operation, and has been extensively researched and field-tested. To further extend the adaptability of the catalyst, Davison is prepared to supply it in a wide range of particle sizes.

Book Review

Modern Petroleum Technology; 2nd edition; published 1954 by The Institute of Petroleum, London; 702 pages; 35/-.

The first edition of this work was published in 1946 and was intended to give a conspectus of all the principal aspects of the industry at that time. Many of the previous articles have been revised or rewritten, some are completely new, and an effort has been made to include recent developments so that it may present, at least in outline, the present scientific and technical background of the great oil industry. Some 30 distinguished experts have participated in the compilation and in an excellent symposium on the economic aspects of the petroleum industry.

K. W. Robbins

Otis Promotes Robbins

Otis Pressure Control, Inc., Dallas, has appointed Kenneth W. Robbins as service manager. Mr. Robbins began working for Otis in 1946 as a wire line helper in the Houston division. Since then he has worked as a tubing helper, wire line operator, office manager, caliper engineer, and chief corrosion analysis engineer. In 1952 he was transferred to Dallas as a consulting engineer in the sales department. Later he was named service office manager.

Buys Three Helicopters

Humble Oil and Refinery Co. recently purchased three Sikorsky S-55 helicopters to be used in offshore drilling operations in the Gulf of Mexico. The aircraft will be based at Grand Isle. The California Co., Continental Oil Co. and Gulf Oil Corp. are using similar craft in offshore works.

Ethyl Appointments

Four men are named to new sales assignments in Ethyl Corp. Ellis K. Locher, district manager in Los Angeles, has been named assistant manager of Ethyl's central region, with headquarters in Chicago. T. S. DuBose became Los Angeles district manager, and Douglas Jeppe, Sr., succeeds him as district manager in New Orleans. Kerney J. Hurst, field engineer in Little Rock, became account representative in Oklahoma City to succeed Mr. Jeppe.

Petreco to License Bender Process

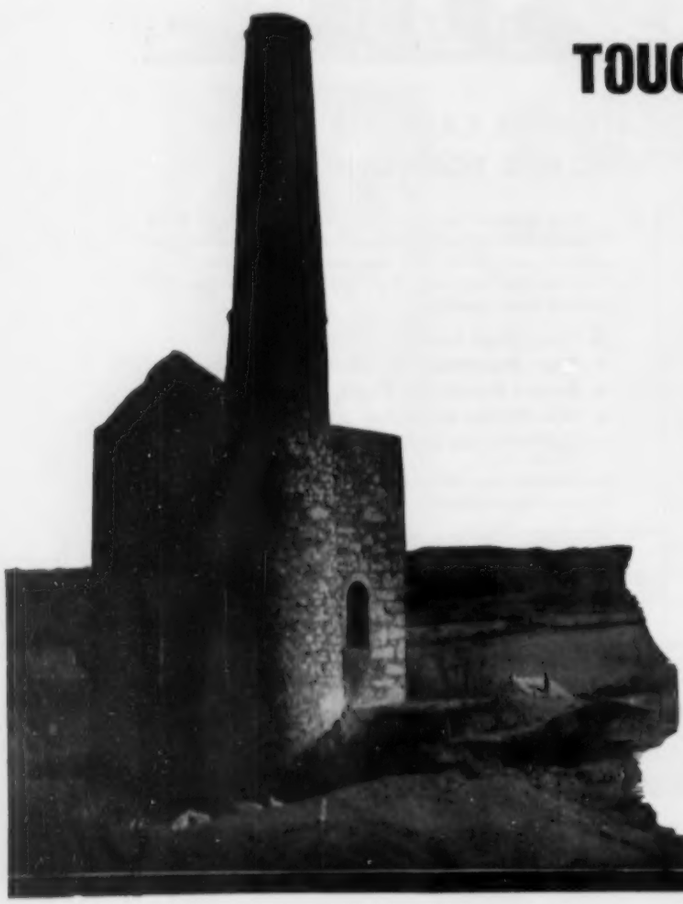
The Petreco division of Petrolite Corp. has been licensed by Sinclair Refining Co. to offer the Bender process for sweetening hydrocarbons in the gasoline-middle distillate range. The process will supplement the Petreco line of Electrofining processes.

The Bender process is especially applicable in the kerosine-No. 2 fuel range. Sweetening is effected by converting mercaptans to disulfide by oxidation. In this process, sulfur is added to the distillate, plus a small amount of an alkali such as caustic or ammonia, plus air. This mixture is passed over a bed of solid catalyst, yielding a bright, sweet, noncorrosive product.

Book Review

The Role of Petroleum in Modern Transport, edited by George Sell; published 1955 by Institute of Petroleum, London, W.1; 185 pages.

This is a symposium comprising nine papers presented at the summer meeting of the Institute of Petroleum in 1954 which together form a comprehensive survey of fuel and lubricating problems relating to transportation by road, rail, air, and sea. The discussions that followed each paper are also reported. K. C. Hung, author of the ninth paper which is titled *Future Trends in Quality of Fuels and Lubricants in Transport,* makes some interesting predictions of what fuels and lubricants are likely to be in 1965.



TOUGH AS CORNISH GRANITE

In its time, the old engine-house at Carn Brea lowered many generations of miners deep down into the granite to dig for tin. Now it is only a picturesque ruin.
But not far away the firm that made tools for the same nineteenth-century miners is very much alive. Climax drills, compressors and pneumatic equipment now go all over the world. Tough as granite and as rugged as the ancient Cornish miners, they are famous for hard work and one hundred per cent reliability in the very worst conditions.

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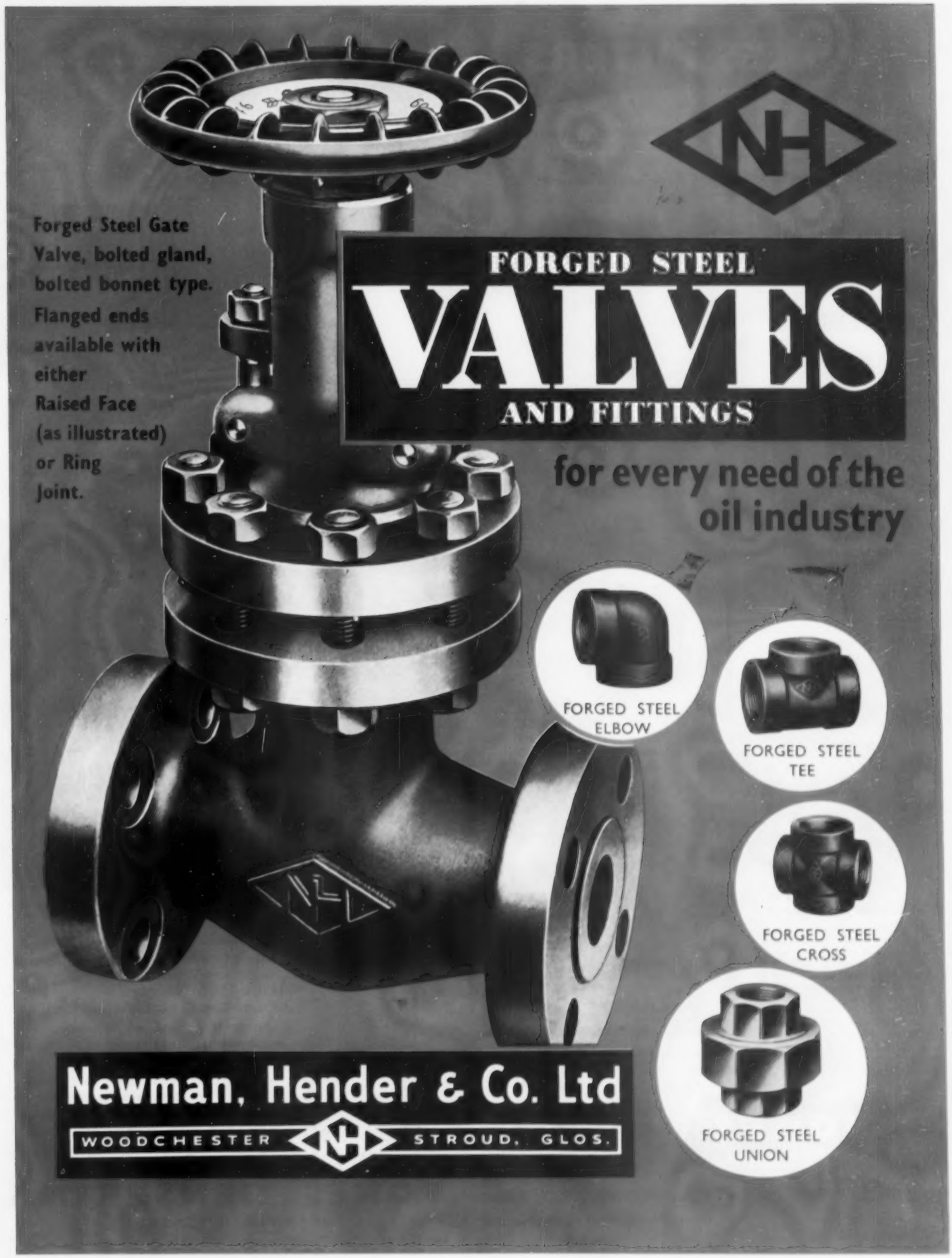
Forged Steel Gate Valve, bolted gland, bolted bonnet type. Flanged ends available with either Raised Face (as illustrated) or Ring Joint.
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AND FITTINGS
for every need of the oil industry
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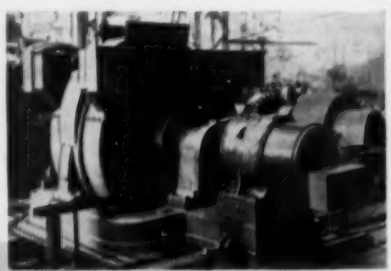
PLAY A VITAL PART IN KEEPING THE OIL FLOWING

In the blinding desert dust storms which sweep the area of the Iraq pipelines, VOKES filters have twice been chosen for the important task of protecting pumping stations and ancillary equipment . . . proof indeed of the important part which VOKES filtration is playing throughout the world in safeguarding plant and machinery from wear, breakdown and unnecessary depreciation.
Below are shown three typical aspects of VOKES protection . . . protection which cannot be jeopardized by the non-availability of element replacements because VOKES FILTERS ARE CLEANABLE.

MICRO-VEE PANEL FILTERS FOR ELECTRIC MOTORS

Electric motors breathe too! . . . and these VOKES filters have proved conspicuously successful in preventing the grave damage hitherto sustained during operations in impure air conditions.



VOKES FILTERS FOR ANCILLARY EQUIPMENT

Compressors . . . portable generators . . . welding sets . . . power packs . . . all need protection against the ingress of abrasive dust, whether by air-intake, lubricating oil or fuel.

VOKES FILTERS FOR STATIONARY DIESEL ENGINE

Under abnormal conditions like these, engines have to be doubly protected and these large diesel engines are therefore fitted with Microvee dry fabric filters for cleaning the intake air. Vokes Filters are also specified for atmospheric air filtration in the ventilating systems of many of the desert buildings.

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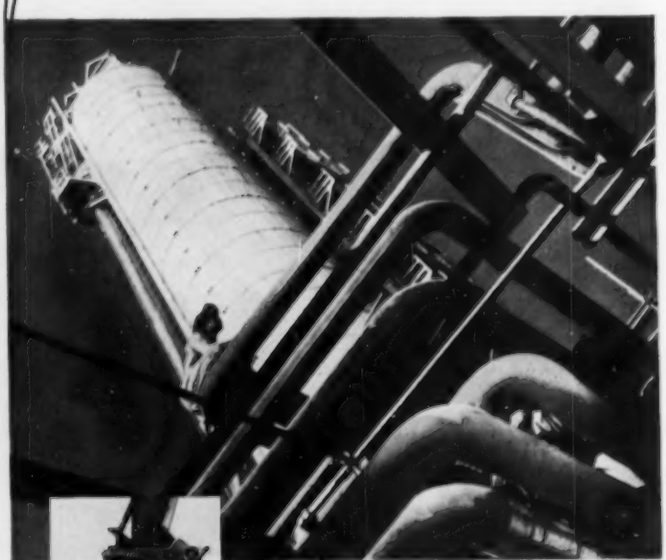
V110

Represented Throughout the World

Photograph by courtesy of 'Shell'

For world-wide oil pipe suspension – VOKES GENSPRING pipe hangers

Throughout the Platforming Unit at the 'Shell' Stanlow Refinery in Cheshire, VOKES GENSPRING Constant Support Hangers are supplying their own incomparable type of support for the piping. Similarly in Aden, where the British Petroleum Company's new refinery came on stream just a year ago, VOKES GENSPRING hangers are used to provide accurate and safe pipe suspension.



Photograph by courtesy of The British Petroleum Company, Limited

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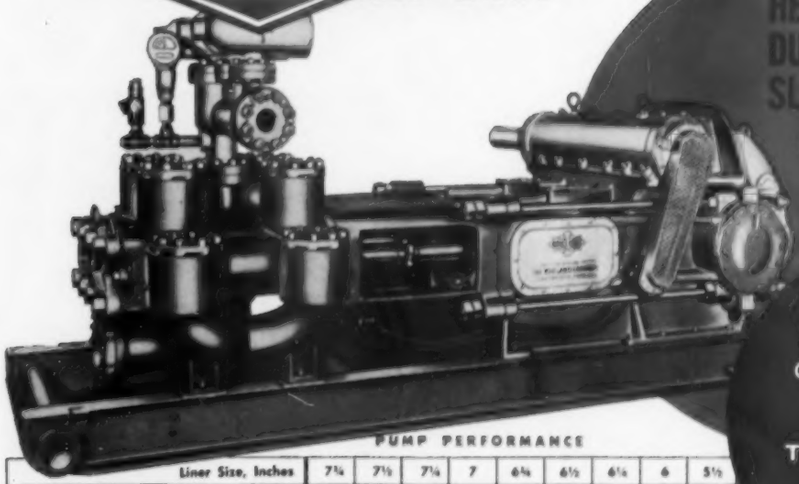

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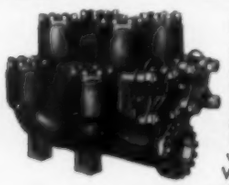
Speed of Crank RPM	Pump Horsepower Rating		Output in U. S. Gallons per Minute Pumped at 100% Volumetric Efficiency								
	Input	Output									
60	750	638	826	770	716	663	613	564	517	472	388
55	689	585	757	706	656	608	562	517	474	433	355
50	626	532	688	642	597	553	511	470	431	394	323
45	563	478	619	577	537	497	460	423	388	354	291
40	500	425	550	513	477	442	408	376	345	315	258
35	438	372	482	449	417	387	357	329	302	275	226
1			13.77	12.84	11.94	11.06	10.22	9.41	8.63	7.83	6.47

For complete details and specifications write for bulletin LE-182A



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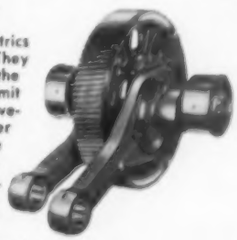

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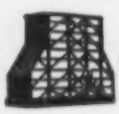

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New Standard Published

A new standard of measuring, sampling and testing of crude oil and petroleum products has been published by the American Petroleum Institute. To be known as Standard 2500, it will replace, in part, API Code 25, Seventh Edition, dated June 1948. API President Frank M. Porter announced that the new standard is to become effective January 1, 1955. The new edition does not include any items relating to the calibration of containers. This material will appear later in Standard 2501.

Standard 2500 will be available in two sizes: one, 8 by 10½ inches, and the other in lefax size, 3¾ by 6¾ inches. Either size may be obtained at $1.00 each through the New York or Dallas offices of the Institute.

New Rinehart Yearbook

Rinehart Oil News Co. has published the 1955 Yearbook, containing a 21-state breakdown of last year's discoveries, major extensions, and significant wildcat failures, supplemented with state, field, and area maps, and summary information of regional trends. The double-volume publication carries detailed histories on 3,834 wells (2,521 discoveries or major extensions and 1,313 dry holes) in the mid-continent.

Book Review

Materiels d'Equipement pour l'Industrie du Petrole; published by La Revue Francaise de l'Energie; 480 pages, 2500 French francs.

The Association of French Manufacturers of Equipment for the Petroleum Industry, which was created less than two years ago, has already assembled 225 suppliers and contractors whose activity has proved to be satisfactory to oil industrialists in France and elsewhere. This book is the first issue of their official catalogue describing the materials and equipment which the members of the association are in a position to supply.

Book Review

The Romanian Oil Industry, by Constantin H. Jordan; published 1955 by the Mid-European Studies Center for the Free Europe Committee, Inc., New York University Press; 357 pages, $10.

The author of this book is an exiled Romanian petroleum engineer who held for many years top executive positions in oil enterprises and in the technical organizations of the industry in that country. Forced out when the communists took over, he carried with him a full knowledge of the industry at the end of 1947. Since then, by diligent collection of all sorts of available information corroborated by reports of refugees and other private sources, he has been able to construct a more or less authentic picture of the Romanian industry in its present condition under the domination of Moscow. As he now sees it, on the basis of what he has been able to learn, Russian control of Romanian oil means a decisive increase in the war potential of the Iron Curtain countries. The rapidity and intensity of communist exploitation shows that Moscow has no lack of awareness on this score. The Soviet-Romanian oil monopoly is exploiting the Romanian oil fields with a frenetic haste that can only be described as looting the satellite country. The author believes that the Russians are impelled to this looting by the fact that the appreciable post-war gains of the Soviet oil industry have been largely offset by such factors as shortage of equipment, lack of cracking capacity commensurate with the increased production of crude, the necessity of supplying the Chinese communists, the mechanization of agriculture, and the great effort to increase truck transportation to lessen the strain on their inadequate railroad system. On top of this is their need to accumulate vast fuel stocks against possible war and the consequent certain loss of oil imports.

The author has used such facts as came into his possession since 1947 to paint a lurid picture of what communization has done to a major satellite industry and the methods that were employed to transform a free enterprise industry into a communist one.

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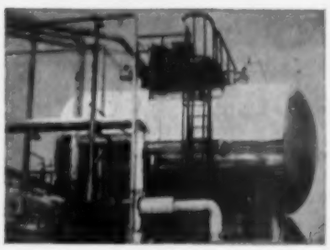

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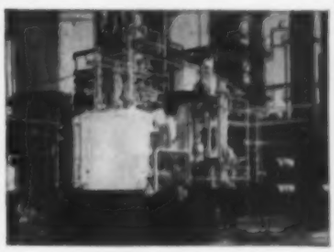

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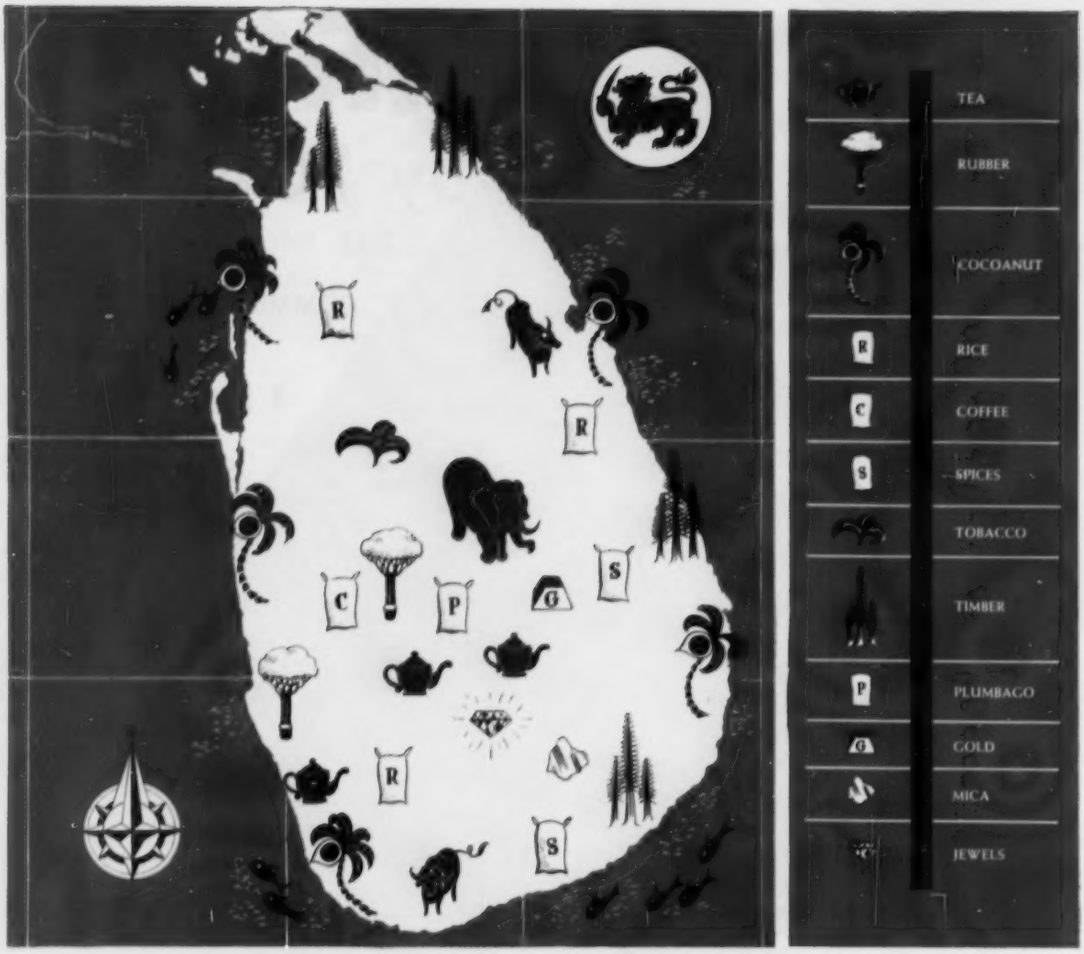

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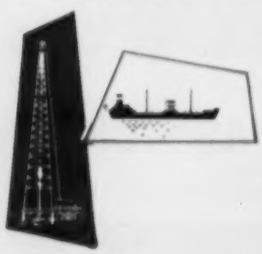

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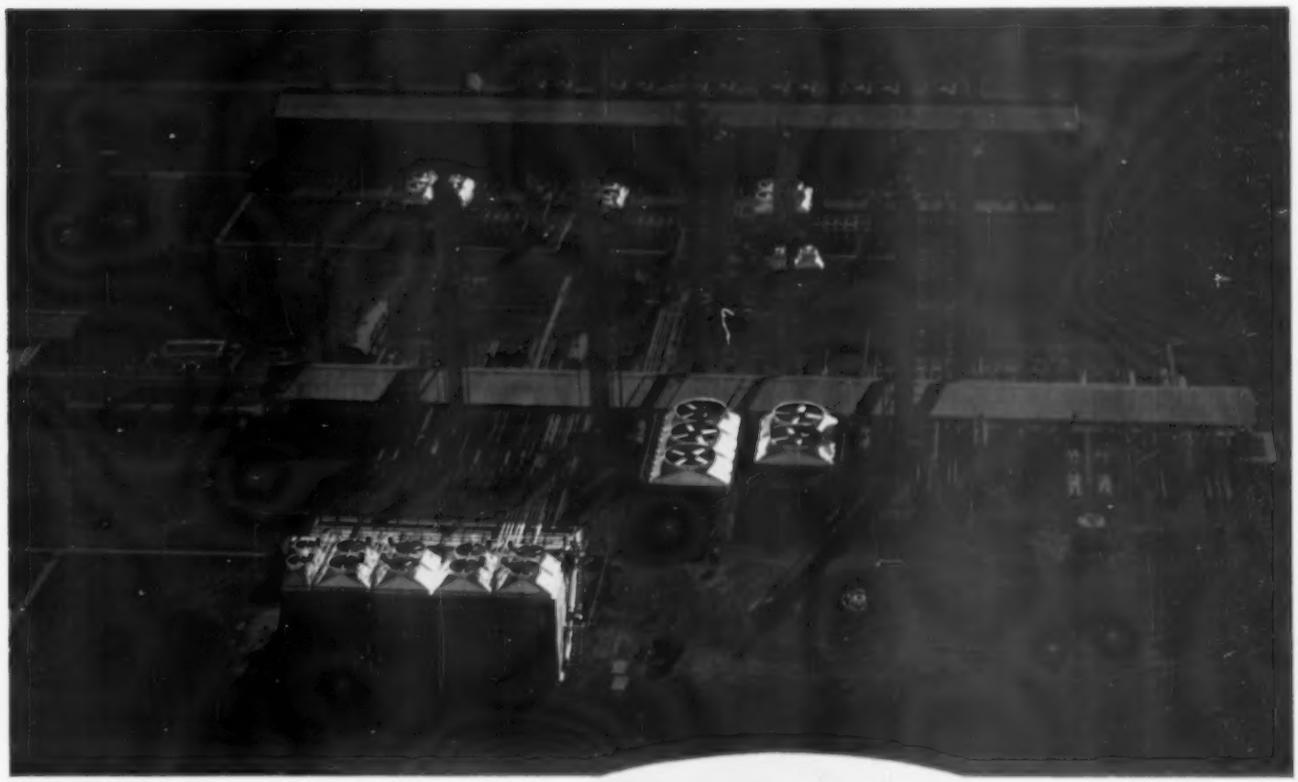

HUDSON *Solo-aire* and *Combin-aire* **COOLING UNITS**

minimize water consumption in the Pegasus Plant of Magnolia Petroleum Company, Midland County, West Texas

Pictured in the foreground is the HUDSON Combin-aire unit, with Solo-aire units in the background. Air is used directly for cooling in the Solo-aires where low temperatures are not required. The Combin-aire uses a small quantity of water to precool the air so that entering hot fluids may be cooled to effluent temperatures lower than those obtainable by direct use of air.

If the total heat load of this plant had been dissipated thru a conventional cooling tower, 158 million gallons of water per year would have been required for makeup. The actual annual water makeup for the plant is only 17 million gallons per year. In this plant the use of the Solo-aire and Combin-aire have proven advantageous, resulting in savings in first cost, in operating costs for horsepower, water treating, and maintenance, and in obviating necessity for drilling of several water wells. Savings in cost of piping result thru installing the Combin-aire in close proximity to process equipment, made possible because the effluent high temperature air is always under-saturated with water vapor and nuisance and high maintenance cost due to water carryover or condensation are eliminated.

New bulletin
"Cooling with Air"
mailed upon request

HUDSON
ENGINEERING CORPORATION

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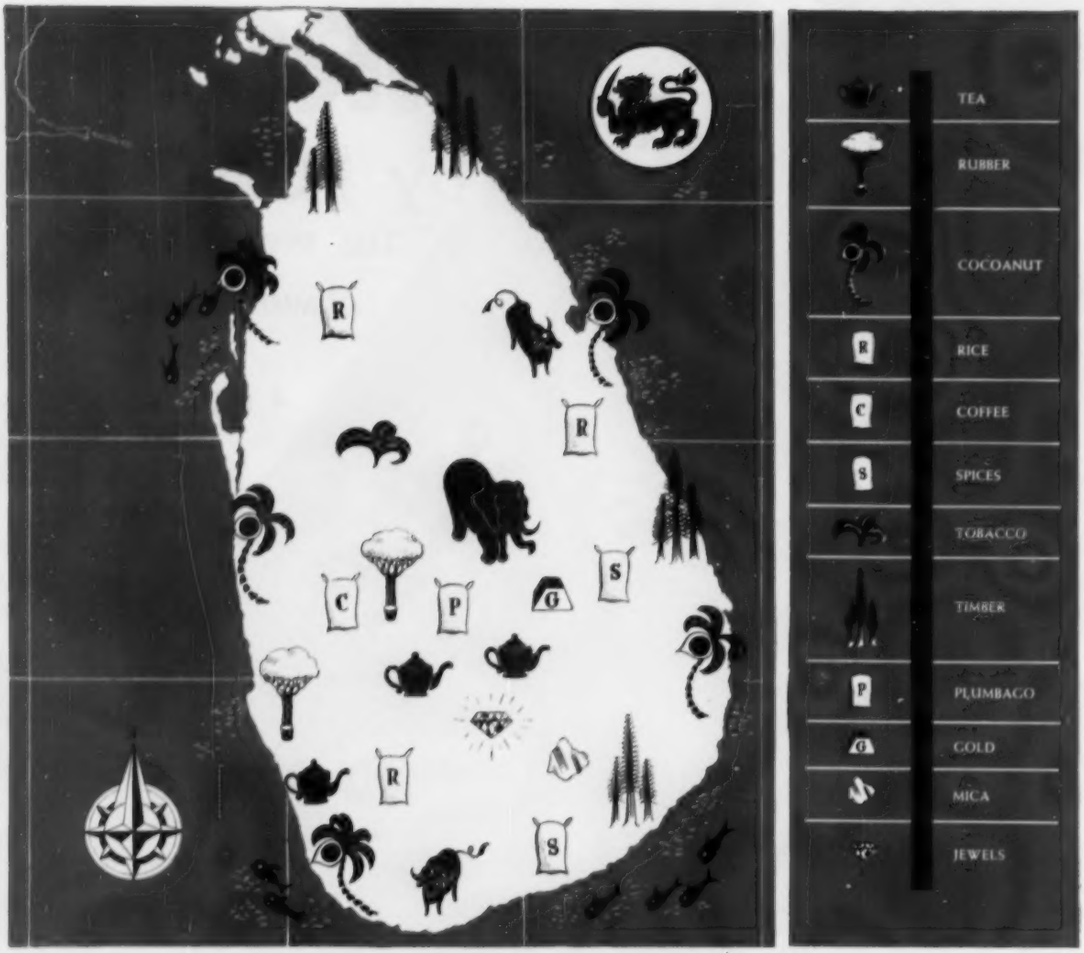

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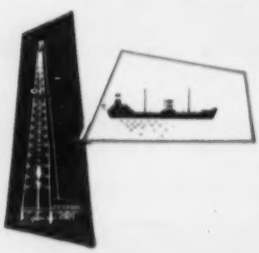
Standard-Vacuum is proud of the part it plays in supplying the petroleum products so essential to the welfare and continued growth of Ceylon.



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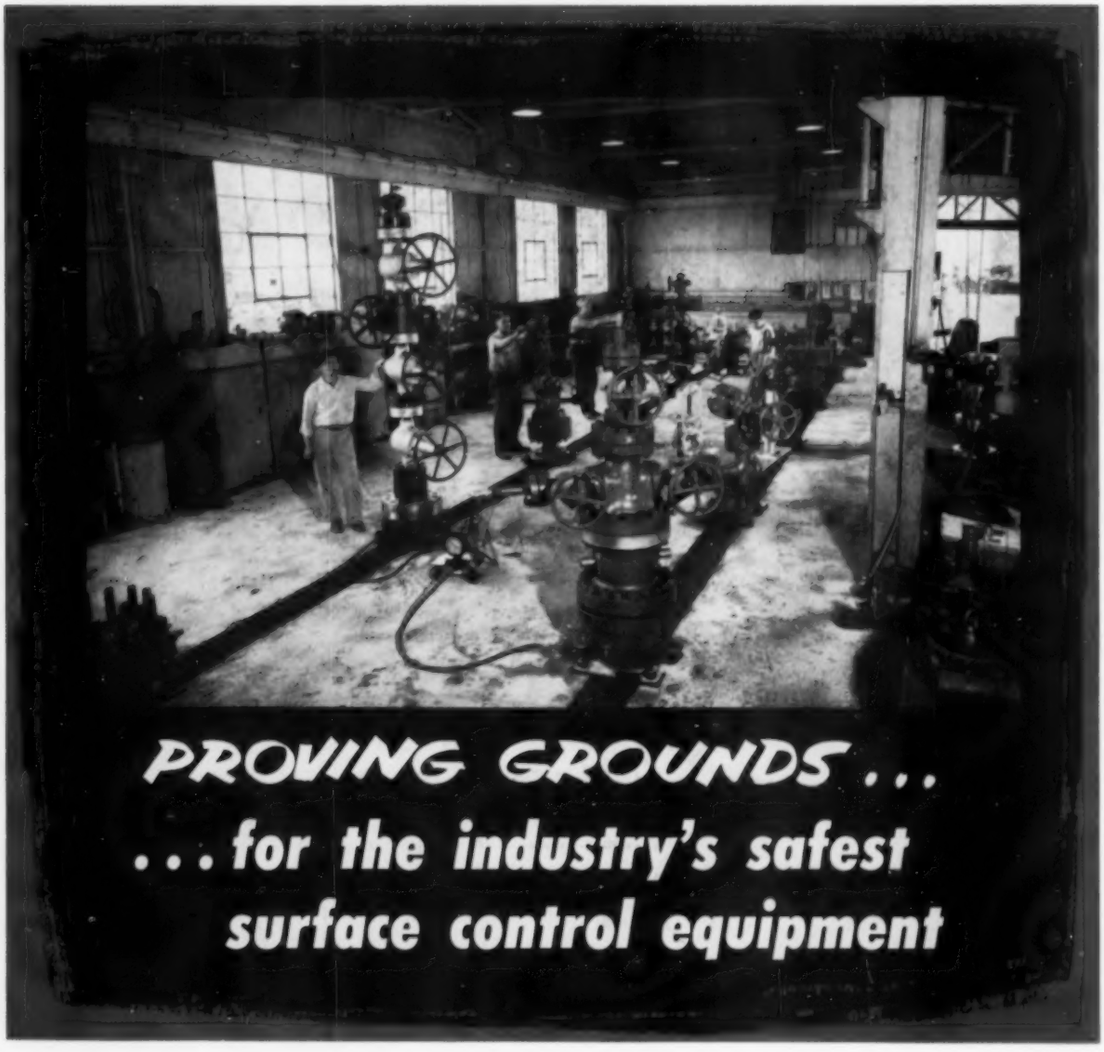

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